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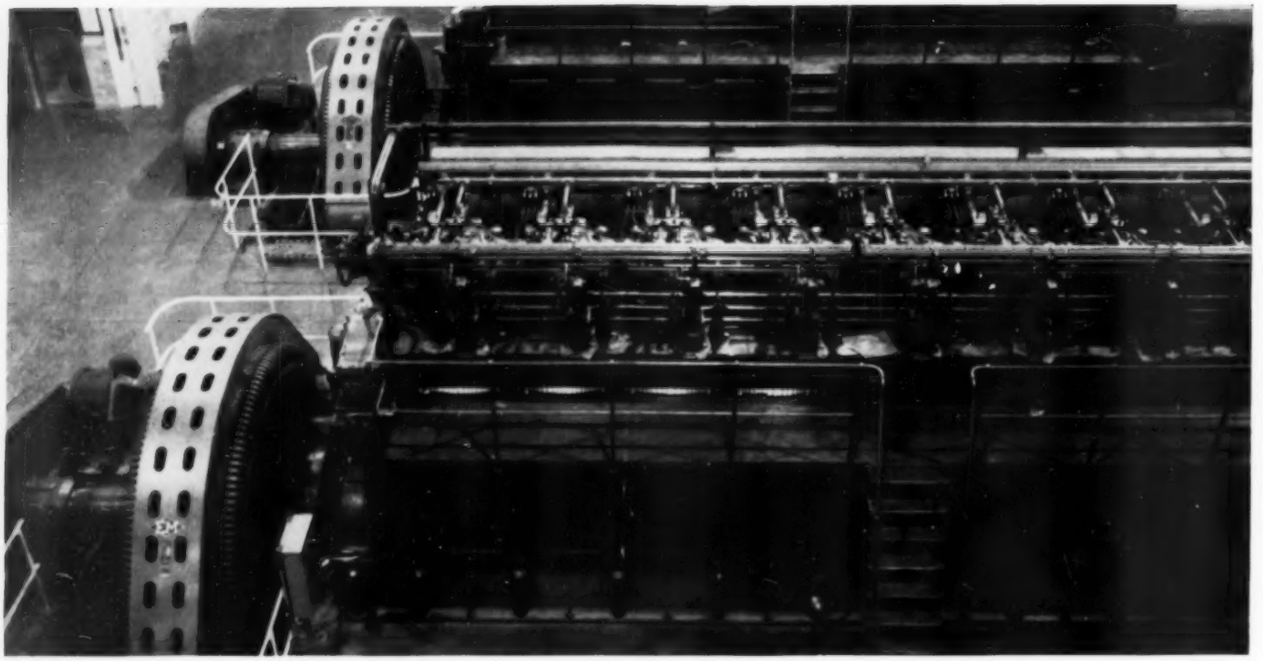

Two Hamilton 4300 bhp dual fuel diesels, installed several years ago in the Central Kansas Electric Cooperative, Inc. plant at Great Bend, Kans., are each turning a generator with a net rating of 3100 kw. Fuel consumption currently averages 2.46 mills/net kwh.

HAMILTON-DIESEL-POWERED PLANT

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Each year since 1950, the publication *Diesel Progress* —through cooperation of the Rural Electrification Administration—has conducted a contest to ascertain the most efficiently operated internal combustion plant among all plants in the REA group.

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The Baldwin-Lima-Hamilton Corporation heartily congratulates the personnel of this plant on its efficiency record.

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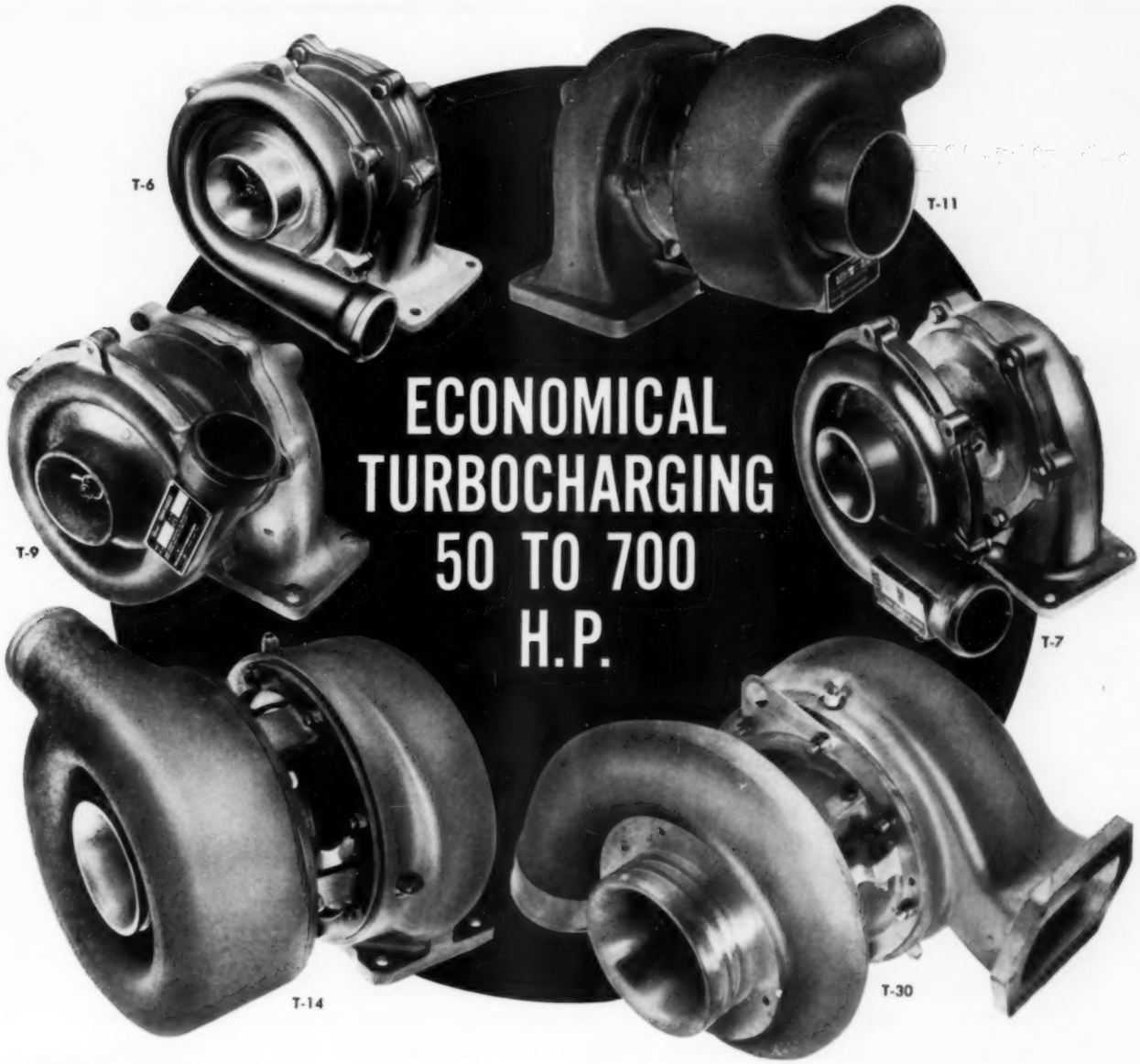

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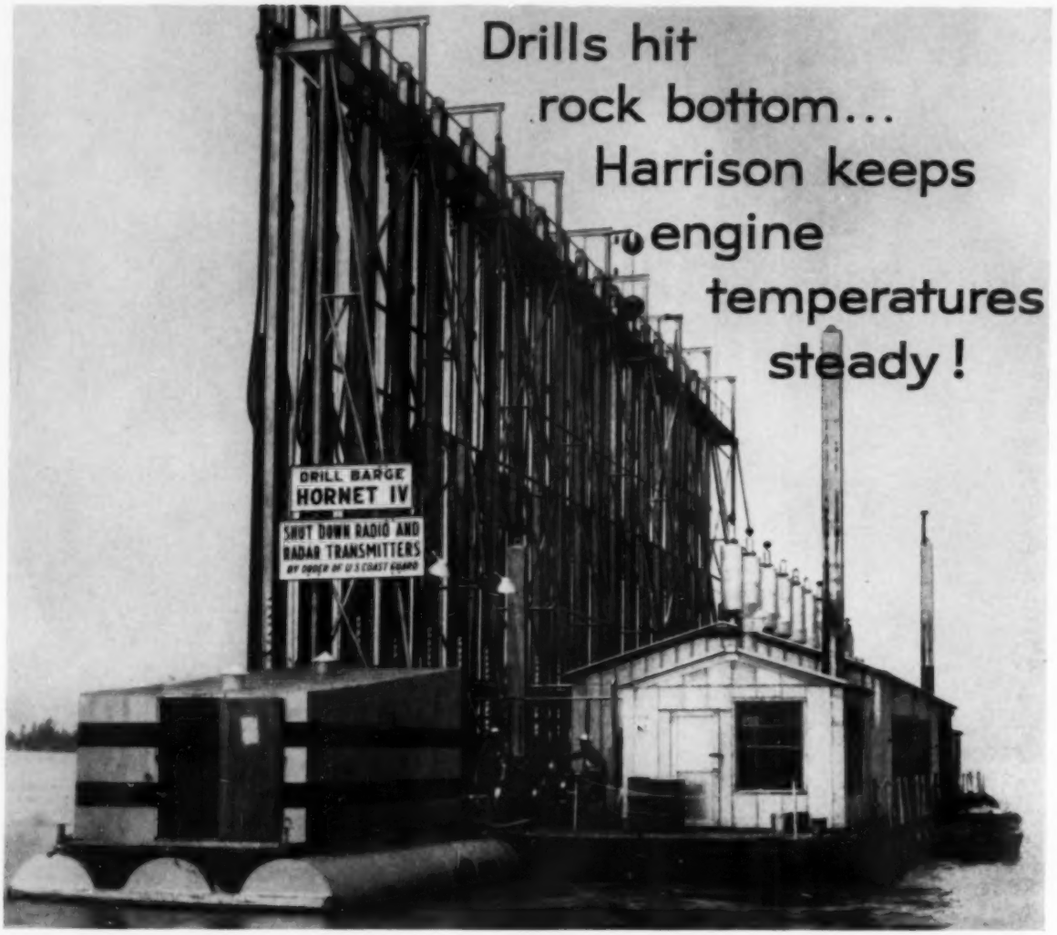

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EXECUTIVE OFFICES
816 N. La Cienega Blvd.
Los Angeles 46, Calif.

EDITORIAL OFFICES
1701 W. Wisconsin Ave.
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BUSINESS OFFICES

MILWAUKEE 3:
Bruce W. Wadman
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FIELD EDITORS

HIALEAH, FLA.:
Edwin Dennis
250 W. 50th St.
TUxedo 8-2188

DUNKIRK, NEW YORK
Robert G. Dyment
220 Central Avenue
DUnkirk 7001

LOS ANGELES 46:
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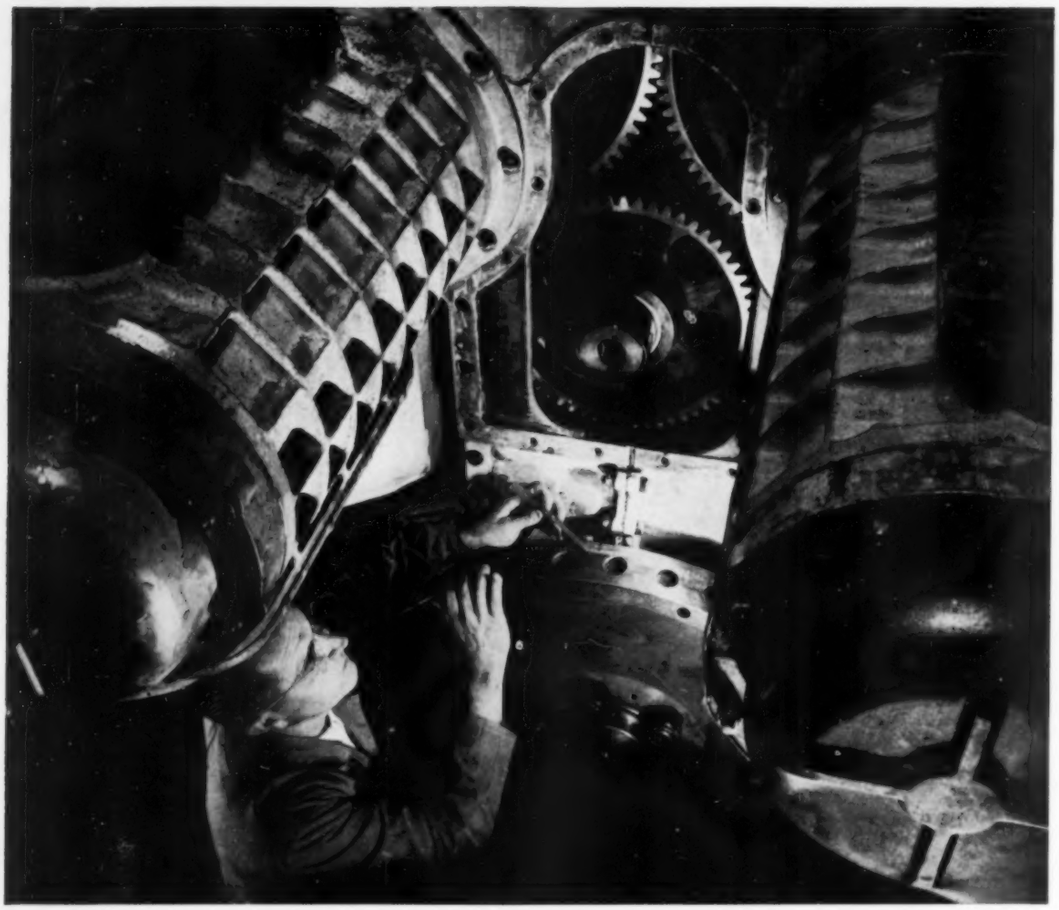
FRONT COVER ILLUSTRATION

Illustrated are the two engraved plaques which DIESEL PROGRESS will present to Division A and B award winners at the R.E.A. Managers' Meeting in Albuquerque, N.M. on April 6, 1959.

ENGINEER'S FIELD REPORT

PRODUCT RPM DELO OIL RR

FIRM NORTHERN PACIFIC RAILWAY
South Tacoma, Wash.



RR diesel gears show only ½° wear in 2½ million miles

Timing gears on this Northern Pacific GMC-diesel locomotive engine, lubricated with RPM DELO Oil RR, recently completed 2½ million miles of severe freight service without repairs or adjustment. NP's South Tacoma Shop Foreman, A. R. Genin (above), indicates degree marks on engine flywheel, used to gauge gear wear. Tolerance between gear teeth shows variance of just ½° from original setting. Mr. Genin says, "We consider this low rate of wear remarkable for heavy-duty freight operation. It is typical of our experience during the 12 years we have used RPM DELO Oil in all our locomotive diesels." Engines are 1350 h.p. 16-567 series.

Why RPM DELO Oil RR reduces wear, corrosion

• Oil stays on engine parts—hot or cold, running or idle • Anti-oxidant resists lacquer formation • Detergent keeps parts clean • Special compounds prevent corrosion of bearing metals • Inhibitor resists foaming.

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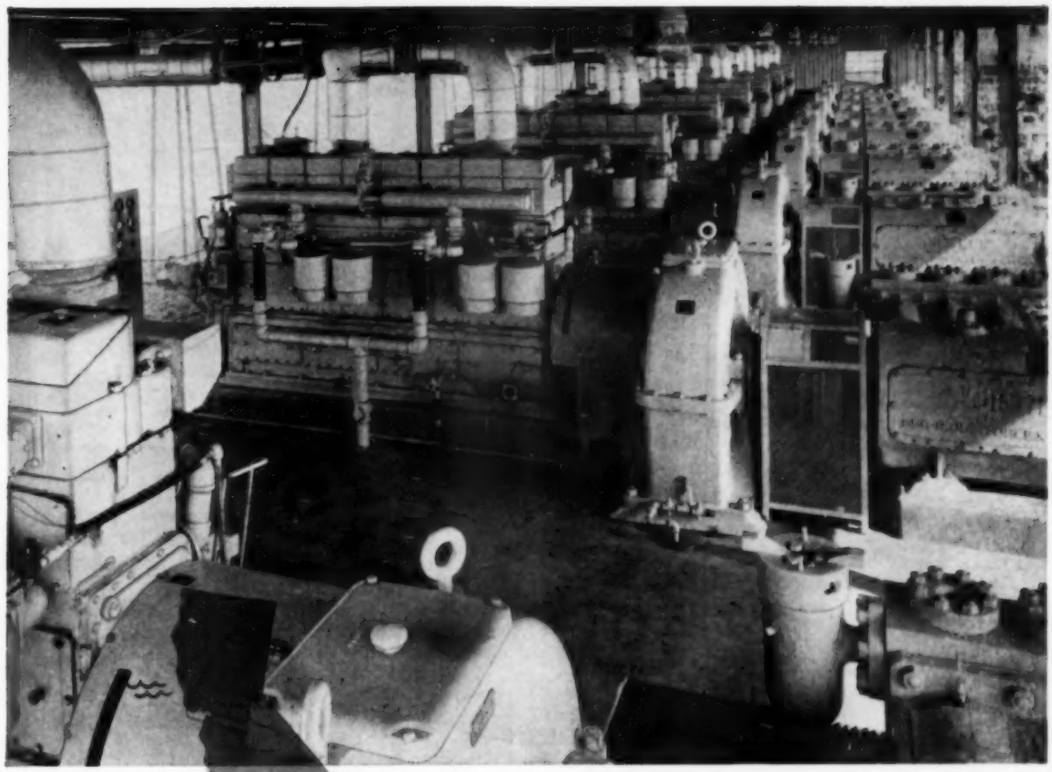

Superior engines power the pumps for world's largest waterflood!

At City of Long Beach's busy waterflooding plant on City Pier "A," 8 White Superior gas engines drive pumps that suck 120,000 barrels per day from the Pacific and inject it into Wilmington tract beneath the city. This waterflooding project, which may eventually reach 1,000,000 bpd to become the world's largest, provides additional pressure for secondary oil recovery, and may possibly arrest or ameliorate land subsidence in the port area.

Dependable Superior engines are a wise choice for this open air, round-the-clock, long range pumping duty. Each Superior Model 8G-825 at Long Beach is rated 500 HP at 862 RPM to drive pumps through speed reducers. This true, conservative horsepower rating eliminates "straining" which shortens engine life. It also allows plenty of reserve power to meet extreme operating conditions. Superior's rugged open chamber combustion, precision construction and many new improvements combine to conserve fuel.

For every oil field job—waterflooding, drilling, production and pipe line pumping, repressuring, compressing or electric generation—specify Superior. Available in diesel, dual-fuel or gas engines from 190 to 2150 HP and in portable or stationary generator sets from 150 to 1500 KW. Get complete information from leading oil field distributors, White oil field representatives, or through . . .

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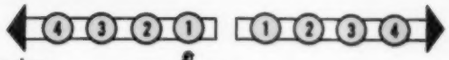

1. **4 speeds forward and reverse.** All power shifted! Provides maximum horsepower to load under all load conditions.

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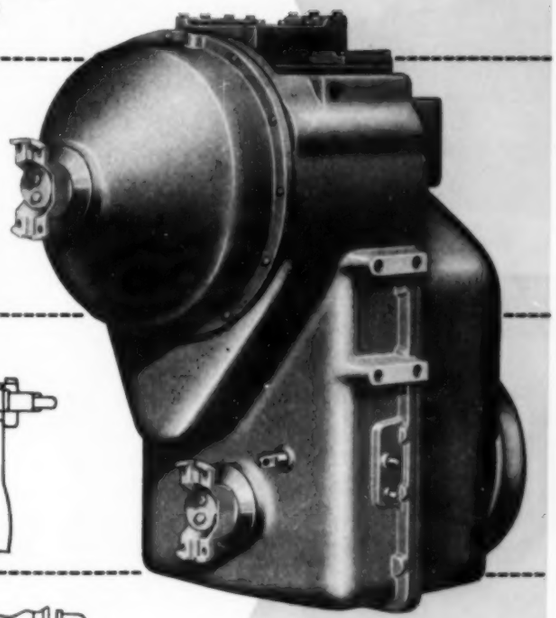
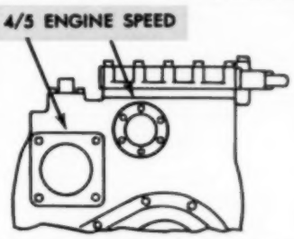
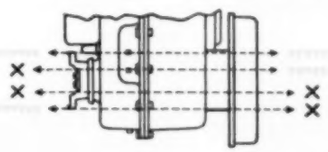


3. **Dual reduced speed pump drives.** Pumps can be driven at engine speed or 4/5 engine speed for longer life and increased horsepower to pump load. Single pump drive is also available.



4. **Full disconnect** provides four combinations of split drive . . . from torque on both shafts, to both shafts in disconnect.



SPECIALLY DESIGNED FOR SMALLER INSTALLATIONS

Rockwell-Standard's new model Hydra-Drives Full Power Shift Transmission is now available in sizes especially designed for smaller installations, such as front end loaders, fork trucks, scrapers, crane carriers, rubber tire tractors and military vehicles.

In addition, the Hydra-Drives BDB offers easier servicing and maintenance. There are fewer moving parts and bearings. The simple, rugged countershaft design and spur gears simplify maintenance.

HYDRA DRIVES
ROCKWELL-STANDARD CORPORATION
TRANSMISSION AND AXLE DIVISION
DETROIT 32, MICHIGAN

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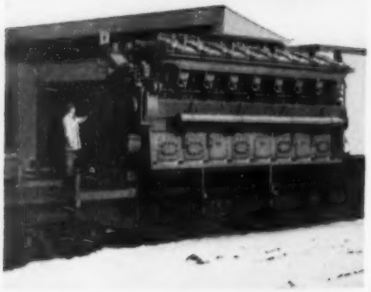
ARE YOU AN ENGINE EXPERT?

An interview with William M. Kauffmann, Chief Engineer of the Engine Division, Worthington Corporation An engine is only as good as the design philosophy behind it. In this short interview, Mr. Kauffmann answers some of the questions most frequently asked him. If you would like to have more complete information about the Worthington line of engines and engine compressors, won't you write to Worthington Corporation, Section 43-6, Harrison, N. J. In Canada: Worthington (Canada) Ltd., Brantford, Ontario.

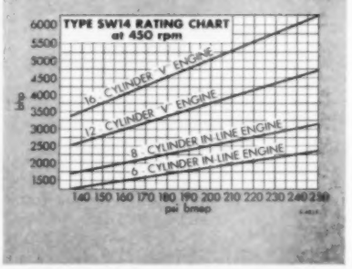
WORTHINGTON

Q. WHAT SPEED RANGE SEEMS BEST FOR CONTINUOUS-SERVICE HEAVY-DUTY ENGINES OF 1500 TO 5000 HP?



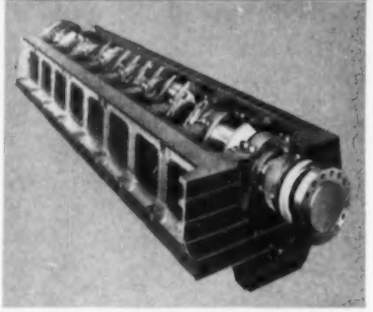
A. Our belief is engines can operate safely today at speeds in the neighborhood of 500 rpm. Shafts can be designed free of critical vibrations through all speed ranges. Of course, other advantages obtained from higher speeds are smaller and less costly generators, less required floor space.

Q. HAS THE MODERN ENGINE REACHED ITS LIMITS IN BMEP?



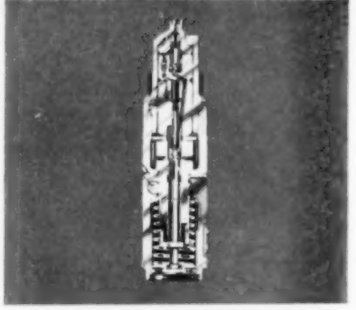
A. Certainly not. Our SW14 engine, while presently rated at 169 BMEP, was structurally designed for ratings in excess of 200 BMEP. Current research has shown the wisdom of our thinking since we have actually operated this engine in our Research Department at over 200 BMEP.

Q. IS THERE ANY DIFFERENCE IN ACCESSIBILITY OF ENGINES IN THE SIZES MENTIONED ABOVE?



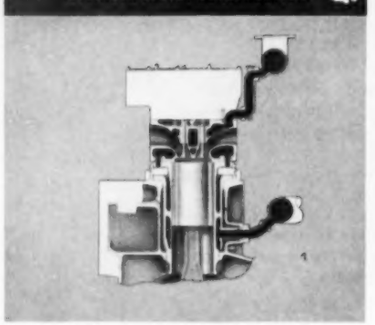
A. Yes, there is. Some engines maintain underslung crankshaft design commonly used on automotive type engines. We agree with the merits of that design on small engines which can be rolled over for access to bearings. In the larger stationary types, we believe the crankshaft should be supported in the base and accessibility to bearings provided through amply large side openings.

Q. WILL MEDIUM SPEED ENGINES BURN RESIDUAL FUEL SUCCESSFULLY?



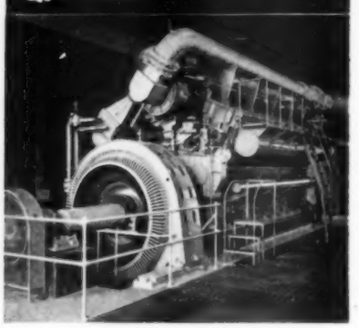
A. Field installations of these units, operating continuously on residual fuels, and reliably supplying power at lowest cost, have demonstrated that this answer is "yes." Contributing to this successful performance is the pre-injection principle patented in Worthington's dual plunger pump. More complete combustion is obtained by introducing a pilot charge ahead of the main charge.

Q. WHAT ARE ADVANTAGES OF INTEGRAL CYLINDER JACKET CONSTRUCTION?

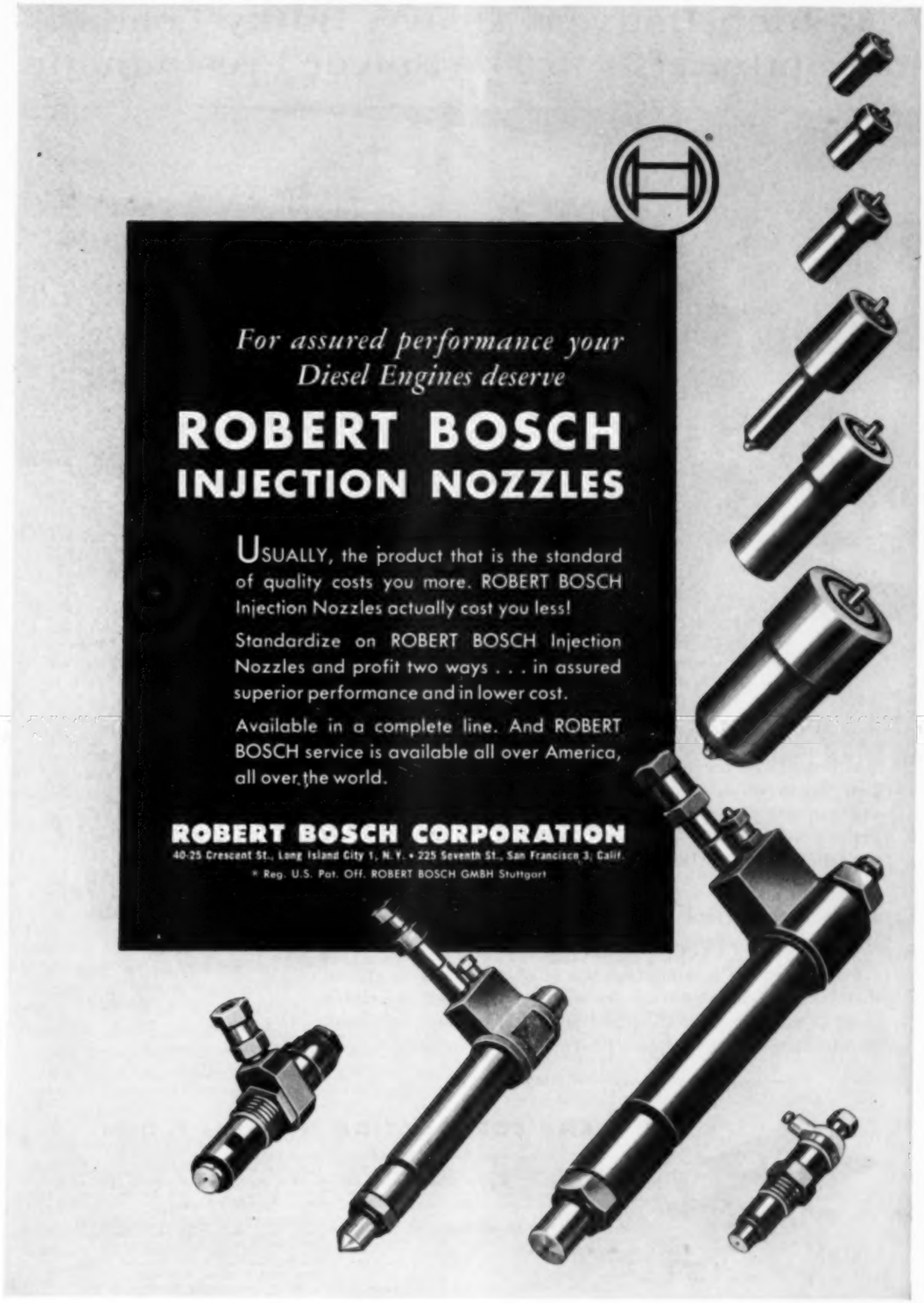


A. The major advantage is simply this: conventional design using wet sleeve liners and sealing rings may be subject to possible leakage of cooling water into the crankcase. The one-piece liner and jacket construction eliminates this problem. In addition, this type of construction provides for more efficient cooling by means of the annular water space. As such, it is particularly adaptable for high temperature cooling.

Q. WHAT OTHER TYPES OF FUELS CAN BE UTILIZED?



A. Modern turbocharged engines designed in accordance with Worthington's tri-power principle readily operate as dual fuel, spark ignition or oil diesel—with no change of compression ratio or major engine components. Experience with almost 2-million installed horsepower of all of these combinations in successful operation, provides us with a generous background for future progress in the field of fuel utilization.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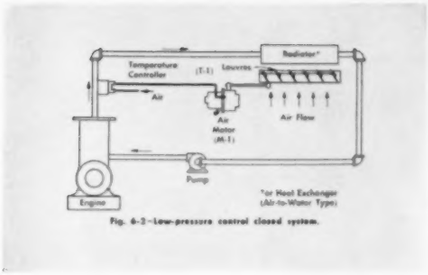

Fig. 6-2—Low-pressure control closed system.

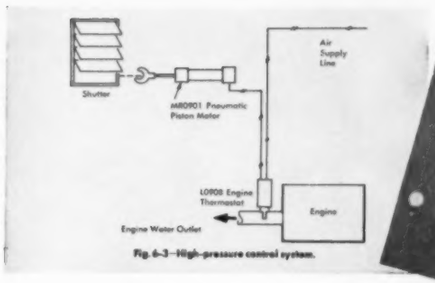

Fig. 6-3—High-pressure control system.

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Merle W. Bogan, Service Manager, Smith's Transfer

Mr. Bogan always specifies Purolator because he realizes the importance of effective air filtration. He knows Purolator air filters prolong engine life, cut maintenance costs and reduce downtime to a minimum.

This is why you can be confident that any customer's specification is justified when, like Mr. Bogan, he insists on Purolator filters. What's more, you can confidently recommend Purolator dry-type air filters as original equipment in your own standard line of diesels.

A Purolator engineer will be glad to present further details about the advantages and economies of Purolator filtration in the diesels you make. There's a Purolator filter designed to meet your requirements. Write or phone for full information — right now.

Filtration For Every Known Fluid **PUROLATOR**
PRODUCTS, INC.
RAHWAY, NEW JERSEY AND TORONTO, ONTARIO, CANADA

ENGINEERING

NEWS YOU CAN USE ABOUT ENGINE AND COMPRESSOR PERFORMANCE

HAVING TOP RING TROUBLE?

THE SOLUTION MAY BE IN THE THIRD GROOVE—NOT THE FIRST!

If you've had trouble with your top piston rings (excessive groove wear, groove damage, ring breakage, etc.) you won't need to be convinced that the top ring carries from 50 to 80% of the sealing load. Installing top rings of special, expensive materials is often not the answer. They may be shock-resistant but generally lack adequate wearing qualities. One likely solution is installation of a Cooktite sealing ring in the THIRD groove to relieve the load carried by the first ring. In an engine with a compression pressure of 500 psi and a firing pressure of 1000 psi, a Cooktite ring in the third groove will reduce the pressure differential on the top ring from a trouble-causing 750 psi to an easily-handled 500 psi. Ask a C. Lee Cook representative to explain in detail.

PRESSURE DIFFERENTIAL AT FULL FIRING PRESSURE

WITH COOKTITE SEALING RING IN THIRD GROOVE

500 psi

WITHOUT COOKTITE RING IN THIRD GROOVE

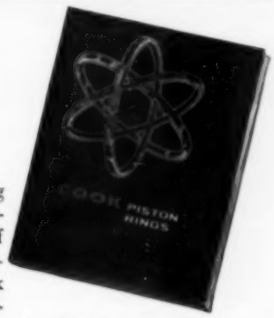
750 psi

"IMPROVE YOUR PISTON RING PERFORMANCE"

SEND FOR FREE 8-PAGE BOOKLET

Write for your free copy of this technical article. Gives valuable data on improving your engine's performance and keeping it high for longer periods by better cylinder sealing. Offers practical advice on (1) how to tell whether rings should be reused or replaced, (2) choosing a ring setup, (3) relieving top ring load, and other problems. In short, it's a brief, handy guide to better piston ring performance. For your copy, write C. Lee Cook Company, 940 So. 8th St., Louisville 3, Ky.

WRITE FOR COOK'S NEW PISTON RING CATALOG



Sixteen-page catalog just off the press. Describes complete line of piston rings manufactured by C. Lee Cook Company, also the special rings of the Airtomics Division. For your free copy, write: C. Lee Cook Company, 940 South 8th Street, Louisville 3, Kentucky.

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Division of Dover Corporation

Rings and Packings Since 1888

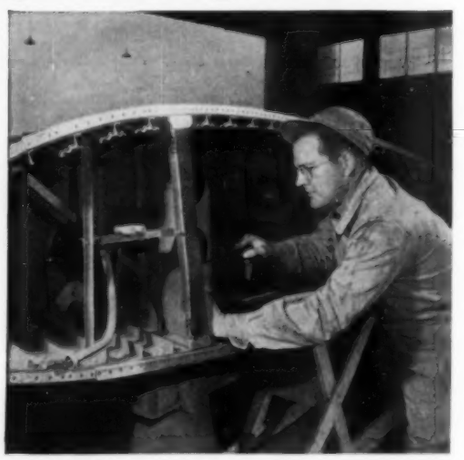
THE U.S. TREASURY SALUTES THE AIRCRAFT INDUSTRY

—and its thousands of employees who help strengthen America's Peace Power by buying U.S. Savings Bonds

Men and women who make up the great group who design, fabricate, assemble and test our newest aircraft are also making another substantial contribution to our national security. Many thousands of them are buying U.S. Savings Bonds, regularly, through the Payroll Savings Plan.

Regular purchases of Shares in America help these patriotic and thrift-minded people set up substantial reserves for the education of their children, the buying of new homes and the building of their retirement funds. Through the Payroll Savings Plan the practice of thrift is made easy and automatic.

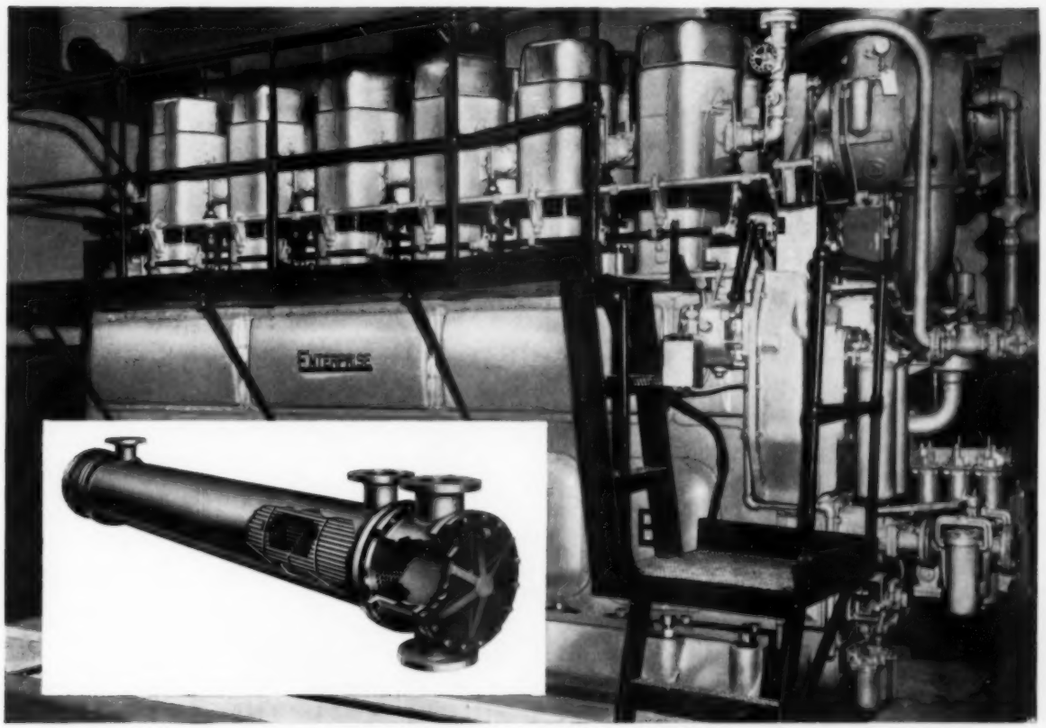
If your company has not yet put in a Payroll Savings Plan, start now. Your State Savings Bond Director is anxious to help and to show you how easy it is to put the Plan to work. Telephone him now. Or write to Savings Bonds Division, U.S. Treasury Department, Washington, D. C.



L. A. MARTIN, skilled aircraft mechanic, is typical of the thousands of valued employees in this field who are buying U.S. Savings Bonds regularly. Mr. Martin, through his company Payroll Savings Plan, is making a personal contribution to the Peace Power of his country.

THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTISM, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.

lube oil cooled by Ross Exchangers



Heat's off on long runs

HIGH SPEEDS, stiff loads, and long continuous service won't take it out on bearings and other close clearance parts of *this* Enterprise engine . . . *the lube oil is Ross Exchanger cooled.* Installed recently at the Belleville, Kansas Power Plant, every working part of this 1455 hp unit is protected by an ample supply of oil at the *right* temperature and the *right* viscosity.

ONE OF THE BIG REASONS why the Enterprise Engine & Machinery Co. uses Ross Exchangers is that they are "recognized by consulting engineers as efficient and well built."

THIS SAME RUGGEDNESS and high thermal efficiency have earned a preference for Ross Exchangers among top-name builders in practically every field of application: engine, compressor, turbine, hydraulic machinery, speed changer, centrifugal pump . . . to cool oil, water, air, gas and hydraulic fluid.

HIGHLY ADAPTABLE and easy to install, compact Ross Exchangers are pre-engineered and fully standardized in a wide range of sizes to meet your heat transfer requirements.

Detailed information is in Bulletin 2.1K5. Write for your copy. American-Standard* Industrial Division, Detroit 32, Mich. In Canada: American-Standard Products (Canada) Limited, Toronto 4, Ont.

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AMERICAN-Standard
INDUSTRIAL DIVISION

AMERICAN BLOWER PRODUCTS • KEWANEE PRODUCTS • ROSS PRODUCTS

Southwest Diesel Notes

By Don Taylor

MIZELL Construction & Truck Lines, Inc. of Liberty, Tex. just purchased two JNS-6-BI Cummins diesel engines that develop 175 hp at 2500 rpm. They will be used to repower two Mack trucks. The sale was made by Cummins Sales & Service, Inc. of Houston.

E. L. LESTER Co. purchased two General Motors series 71, two cylinder 2031C closed type diesel power units to install on a model 50-B American Hoists. Stewart & Stevenson Services, Inc. made the sale.

IDECO Inc. of Dallas bought a General Motors series 71 model 2031C closed type diesel power unit from Stewart & Stevenson Services, Inc.

JACK Anderson, Kilgore, Tex. purchased a 200 hp General Motors series 71 six cylinder turbocharged diesel engine from Stewart & Stevenson Services, Inc. of Houston, Texas.

GULF Oil Corp. of Port Arthur, Tex. purchased one HR-6-IP Cummins diesel to power a Dean Hill pump on a new oil barge. Cummins Sales & Service, Inc. of Houston made the sale.

DRILLING rig auxiliary unit will be powered by a 130 hp NHX-4-IP Cummins diesel engine. Cummins Sales & Service, Inc. of Houston made the sale to S & R Tool Co. of Houston.

RIVERS Construction Co. of Orange, Tex. will repower a 10 ft. dredge with a 320 hp Cummins diesel, model NHRIS-600, purchased from Cummins Sales & Service, Inc. of Houston.

THORSTENBERG & Tamerello of Columbus, Tex. will repower a dragline with a 252 hp (at 900 rpm) Cummins LI-600 diesel engine bought from Cummins Sales & Service, Inc. Houston.

JOHNNY Wells, Houston has a new 175 hp JT-6-B Cummins diesel to power an International RD-205. The sale by Cummins Sales & Service, Inc. Ft. Worth.

THOMAS Kale Trucking Co., San Antonio purchased a Cummins NH-220 for a Kensworth S 21 C. The sale was made by Cummins Sales & Service, Inc. Ft. Worth.

IDECO Inc. of Beaumont will install a General Motors series 71, 6 cylinder model 6080 torque converter on a new drilling rig. The unit was sold by Stewart & Stevenson Services, Inc.

ASPHALT plants. J. W. Bartholow Machinery Co. of Dallas purchased one Stewart & Stevenson, model 18-GD-generator set. The 300 kw unit is powered by a General Motors quad six diesels.

GRAYBAR Electric Co. Little Rock, Ark. bought a Stewart & Stevenson model 110 GD-165 generator set. The 150 kw unit will furnish emergency power for the Little Rock Air Force Base.

Weaver Appointed Service Manager

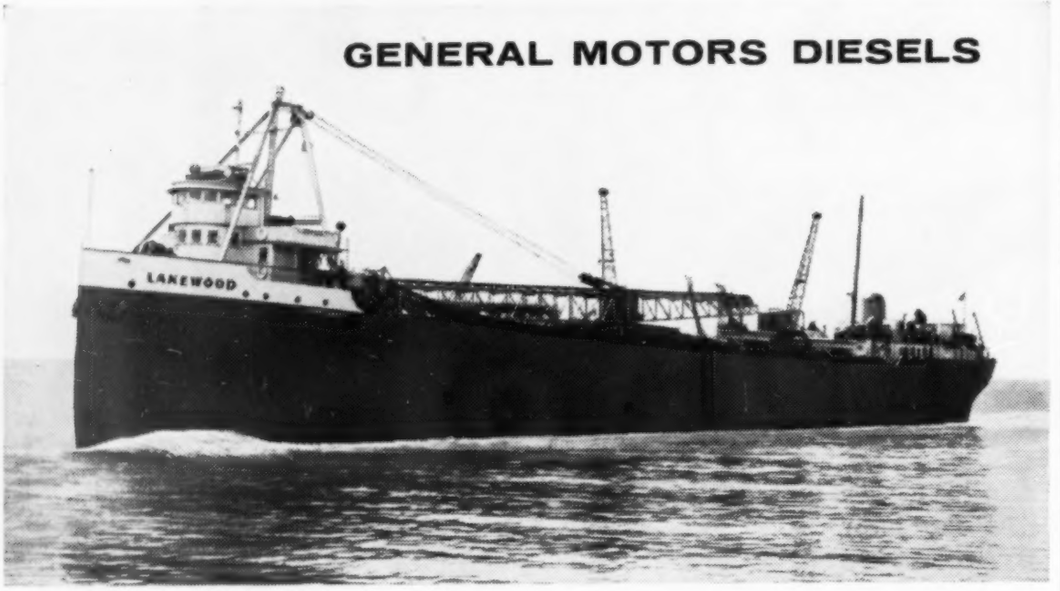
Appointment of C. A. Weaver to the post of service manager, Tulsa field office, is announced by George Edick, sales manager Domestic Division of The Cooper-Bessemer Corp. Since joining Cooper-Bessemer in 1951, Weaver has been responsible for field service work in various areas of the country where engines and compressors are used, Edick points out. Mr. Weaver will now be directly responsible for all operations of the company's equipment in the greater Tulsa area. Prior to joining Cooper-Bessemer, Mr. Weaver was associated with the Fluor Corporation.

M/V LAKEWOOD'S

EARNINGS INCREASED

AFTER CONVERTING FROM STEAM TO

GENERAL MOTORS DIESELS



M/V LAKEWOOD, operated by the Erie Sand Steamship Company, was converted from steam to GM Diesel power in the winter of 1957-1958, at the Erie Sand Steamship Company's yard, Erie, Pennsylvania.

In the first season of operation after conversion, the earnings of the M/V LAKEWOOD were increased because:

1. Cargo capacity was increased by 365 tons
2. Twenty-two more trips were made in a 195-day season
3. Speed was increased by 2.1 statute miles per hour
4. Fuel costs were reduced
5. Maintenance costs were reduced
6. There were three less operating personnel
7. Twenty-one less days for fitting out and laying up

For every kind of marine operation it pays to install General Motors Diesel engines for more efficient and more economical operation.

•

A good product plus good service gives top performance

CLEVELAND DIESEL

Engine Division of General Motors • Cleveland 11, Ohio

Elliott Promotes Hohenstein

Mr. F. C. Hohenstein has been announced as Chicago district manager for Elliott Co., succeeding W. E. Widau, who has been Elliott Chicago manager for many years and who is now midwestern regional manager. Mr. Hohenstein, a native of Batavia, Ill., graduated from Purdue in 1944 with the degree of BS in mechanical engineering. Although he joined Elliott at that time, he immediately spent two years in the military service. Upon returning from this tour of duty, he was in the heat transfer application engineering department, in Jeannette, for two years before being assigned as a field engineer in the Chicago office, July 1, 1948.

Worthington Names McManus

Mr. Patrick L. McManus has been appointed assistant manager–Marketing Division and Eastern Regional Sales Manager of the Worthington Corp. announces A. W. Fraser, general marketing manager. In his new post, McManus will be located at the corporation's headquarters, Harrison, N. J. Mr. McManus joined Worthington in 1936 after receiving his B.S. degree at the University of Kansas and his Master's degree in metallurgical engineering from the University of Idaho. He served in various sales capacities at the corporations Seattle and Cleveland district offices prior to his appointment in 1952 as Manager of the San Francisco District Office. Replacing Mr. McManus as manager of the San Francisco District Office is William M. Fine who for the past five years has been serving as manager of the Minneapolis District Office. Mr. Fine is a graduate of Lehigh University (class of 1939) where he obtained a B.S. degree in Industrial Engineering. He joined Worthington's Student Training Program in September 1939 and was assigned to the Chicago District Office as an estimator and then as a general line salesman. In 1952 he was appointed Milwaukee branch manager and in 1953 was appointed manager of the Minneapolis District Office.

American Bosch Names Haines and Watner

Mr. Stanley L. Haines has been appointed manager, Government Marketing, and J. H. Watner, assistant manager, Government Marketing, for American Bosch Division, American Bosch Arma Corp., according to an announcement by Harold R. Sennstrom, vice president-engineering and sales for the Division. Mr. Haines was formerly staff assistant to the vice president and assistant division manager, in which capacity he was over-all coordinator of military projects. He came to American Bosch Division in 1957 from the Chicago Division of American Bosch Arma Corp. where he had been works manager. Prior to that he was director of industrial engineering for Alco Products, Inc., preceded by a six year association with Bendix Aviation where he was assistant factory manager of the Marine Division. Mr. Haines attended Drexel Institute and Temple University. Mr. Watner came to American Bosch from American Machine and Foundry Co., Brooklyn, N. Y., with which he was associated for seven years and where he was assistant director of operations and manager of project control. Other previous connections were with Stormguard Corporation, New York, N. Y., where he was plant manager, and the U. S. Signal Corps Agency, where he was contracting officer involved in the procurement of research and production projects in the electro-mechanical, radar and fire control apparatus fields. Mr. Watner is a graduate of New York University, a member of the National Management Association and the American Ordnance Association.

Here's where people see eye to eye...

With folks who know filters...

FRAM RANKS FIRST!

Over 400 Engine Manufacturers install FRAM Filters as original equipment—more than any other filter!

If you have a filter problem, FRAM has the wide range of experience and research facilities to help you find the most practical solution in the shortest time. Phone or write **FRAM CORPORATION, Providence 16, R. I.**

FRAM
OIL AIR FUEL WATER
FILTERS

Eastern Diesel Topics

By Robert Dyment

LUBRICATING qualities of Gulf Oil Corporation's Dieselmotive 78 lube oil were tested recently on a New York Harbor tug. This boat, the *Transfer 24*, is powered with a 16-cylinder, 1,590 hp at 750 rpm engine made by the Cleveland Diesel engine division of General Motors Corporation. It operates at full throttle 95 per cent of the time, transferring 3,000-ton loads of freight cars between the New York and New Jersey shores for the New York, New Haven & Hartford Railroad.

GALVIN & Taliaferro, Inc., has been established at 2214 Severn St., Baltimore, to engage in diesel engineering. The firm is authorized distributor for Detroit Diesel engines and will deal in parts and service, overhauling and dynamometer testing, as well as other activities.

HULL No. 386, the *Dalzelleagle*, has been delivered by the Jakobson Shipyard to the Tice Towing Line, subsidiary of the Dalzell Towing Company, N.Y. This is a single-screw tugboat of 240 gt, 95 ft. long between perpendiculars, 25 ft. 10 in. beam, 13½ ft. 7 in. depth. It is propelled by a General Motors geared diesel of 1600 bhp.

HULL No. 1074, the *Mobil Service*, has been completed by Ingalls Shipbuilding for the Socony Mobil Oil Co. This is a small, harbor oil-supply tanker which will be used in New York harbor. It is 90 ft. 10 in. long, 21 ft. beam, 9 ft. 6 in. depth. Propulsion is by a single diesel of 560 bhp.

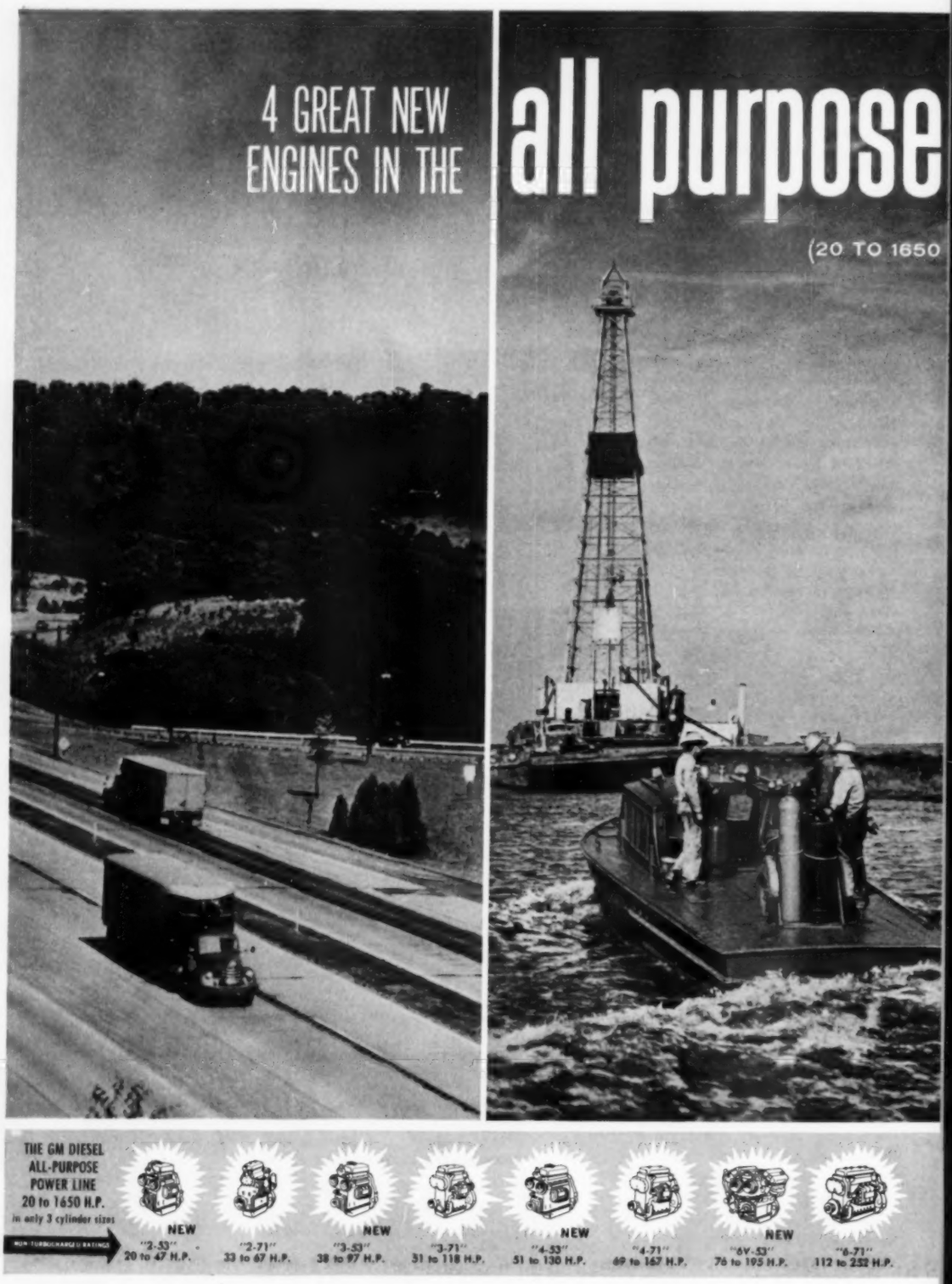
NEW heavy-hauling record was believed established by the Gerosa Haulage Corp., of New York, when it moved by motor truck a giant electric transformer weighing as much as 100 average size automobiles. Hauling experts believe this was the largest load ever moved by this type of motor vehicle. The huge Mack tractor used to pull the load, weighed 23 tons, stood 12 ft. high and was powered by a 425 hp Mack diesel.

ABOUT 8,000,000 yards of sand fill were compacted at Griffith Air Force Base in Rome, N.Y. Working 20 hours a day, the contractor ran Deutz air-cooled diesels in compaction tests.

IN August, 1951, the first Caterpillar DW21 Tractor-Scraper units shipped into this area were delivered to Hendrickson Bros., Inc., Valley Stream, N.Y. Now, after seven years of almost continuous use, they have been replaced with new DW21 Series D and No. 470 lowbowl scrapers supplied by the H. O. Penn Machinery Company, Inc. The DW21 power plant is a Cat turbocharged diesel. Six of these new units were put into service moving overburden for the New York Trap Rock plant at Wappingers Falls, N.Y.

PART of the operating terrain of Smith's Transfer, Staunton, Va.—between Stauton, Va. and Charleston, W. Va.—is recognized by tru.k manufacturers and fleet operators as just about the toughest in the country—grueling mountain territory that demands maximum efficiency. The company utilizes 175 Mack END 673 diesels as the powerplant for their fleet of trucks.

CLOSED-cycle gas turbine test facility to serve as a prototype for a several hundred-kw mobile ground unit is being set up by the U.S. Army Engineers at Fort Belvoir, Va. One feature of the facility will be a control system to maintain a stable turbine speed in order to hold the generator's output voltage at a constant frequency. CDC Control Services, Inc. has been awarded a subcontract for the design, installation and



startup of the turbine speed-control system.

MERRITT-Chapman and Scott Corp. has added thirty "95" Payhaulers to their Niagara Falls, N.Y. Power project equipment spread. Now, the M-C and S Payhauler fleet totals 62 units, largest in the world! The new "95" Payhaulers are powered with an International 335 hp high-torque turbocharged diesel engine. International construction equipment dealers in New York State handled the transaction.

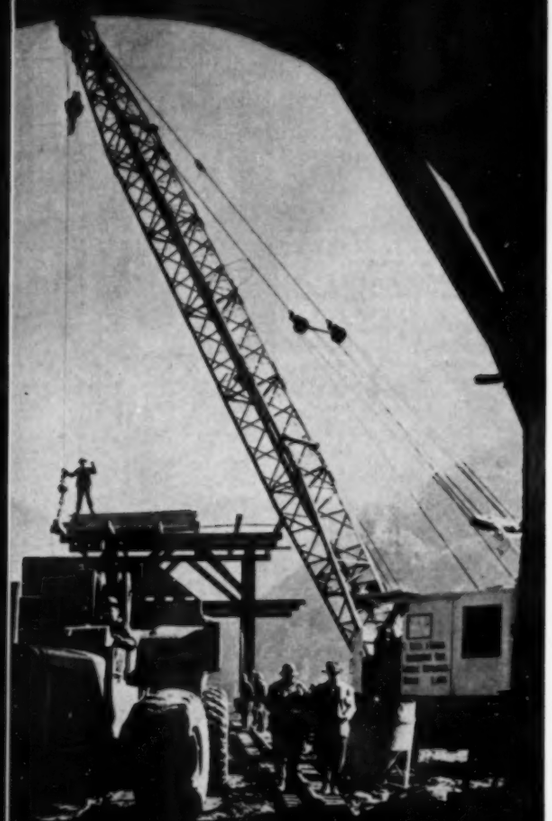
CUMMINS Diesel Central New York, Inc., of Syracuse, announced the addition of Jack Rutz, 134 Fairfield St., Fayettesville, N.Y., to its sales staff. He will cover the following New York Counties, Onondaga, Oswego, Jefferson, Cayuga, Seneca, Cortland and Tompkins.

THE J. H. Mathis Co. has a contract to build one fireboat for the City of New York. When completed, it will be powered by a 1000 horsepower diesel engine.

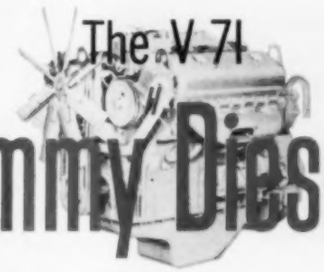
HEMPT Brothers, Camp Hill, Pa., has a new Caterpillar D-9 Tractor and No. 9 Ripper for working in rock and shale, purchased from the Cleveland Brothers Equipment Co.

power line

H.P. IN ONLY 3 CYLINDER SIZES)



The V-71 "Jimmy" Diesels



6-, 8-, 12- and 16-cylinder "V" versions of the famous GM Series 71 Diesel

The new V-71 "Jimmy" Diesels are a further dramatic illustration of GM Diesel's mighty new power concept—rounding out the All-Purpose Power Line—yet retaining the GM Diesel family relationship and parts interchangeability.

Here are engines that combine every profit-making, cost-saving advantage any Diesel has ever had. Diesels that boast an ingeniously engineered combination of new compactness, lightweight, high efficiency, durability and inexpensive maintenance.

Created by GM Diesel engineers to make a hit with cost-conscious owners, All-Purpose V-71 "Jimmy" Diesels are available in 6-, 8-, 12-, and 16-cylinder models rated from 112 to 675 horsepower plus 24- and 32-cylinder "Twins" up to 1650 horsepower, when turbocharged. They're itching to get to work wherever there's hard work to be made easy.

Put a V-71 "Jimmy" Diesel to work for your pleasure or for profit. Write GM Diesel, Dept. B-3, Detroit 28, Michigan, and see how these new members of the All-Purpose Power Line meet your needs.

GM DIESEL

DETROIT DIESEL ENGINE DIVISION, GENERAL MOTORS, DETROIT 28, MICH.

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario
Parts and Service Worldwide

Wiesbaden, Germany, Site of 1959 International Congress Of Combustion Engines

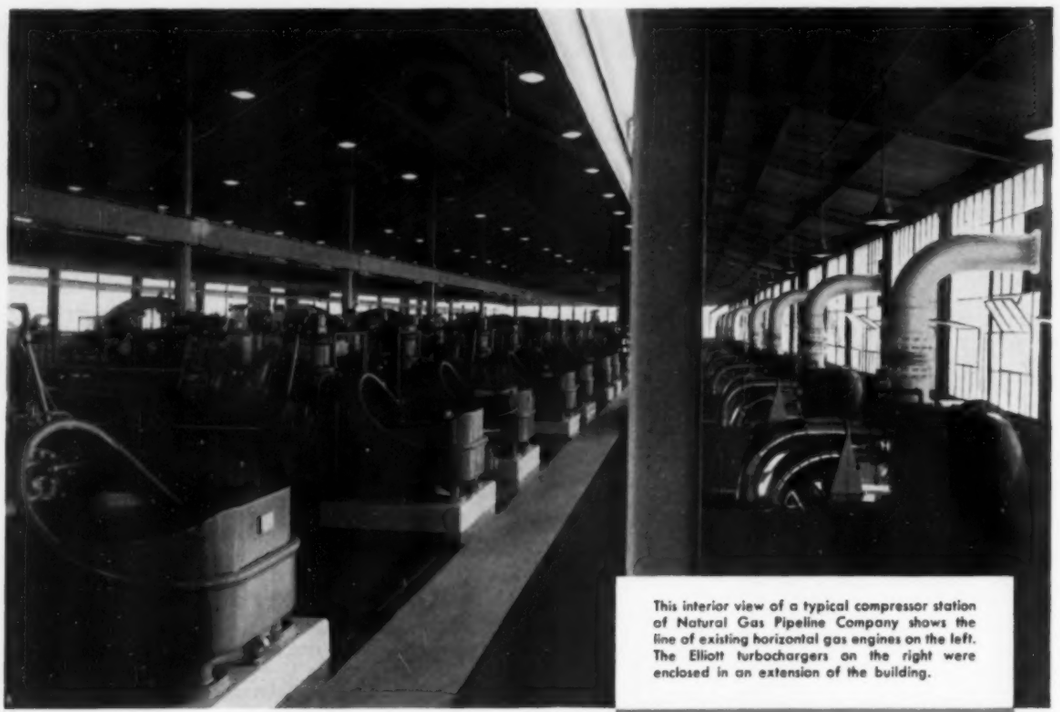
The 1959 International Congress of Combustion Engines, sponsored by the Oil & Gas Power and Gas Turbine Power Divisions of ASME, will be held in Wiesbaden, Germany, June 14-19. Theme of the Conference will be—Diesel Engines and Gas Turbines up to 1500 hp- Current Problems Concerning Design, Production, Development and Running at Site. According to Robert L. Stanley, secretary-treasurer of the U. S. National Committee, approximately 30 papers will be presented. One month before the meeting, all who have registered will receive reprints. Other members of the committee are John C. Gibb, Socony Mobil Oil Co., Chairman; R. Tom Sawyer, Vice Chairman; Robert J. Cramer, Nordberg Mfg. Co.; T. J. Putz, Westinghouse Electric Corp.; and P. R. Sidler, Brown, Boveri Corp.

American Bosch Appoints Assistant Chief Engineers

Appointment of two Assistant Chief Engineers at Arma Division, American Bosch Arma Corp., was announced today by E. A. Goetz, chief engineer. They are Dr. Bernard Litman, assistant chief engineer for research, and Wen Tsing Chow, assistant chief engineer, missile guidance. Both promotions are effective immediately. Formerly Project Head, Inertial Equipment, Dr. Litman graduated from Columbia and Pittsburgh Universities. He joined Arma in 1948 as a development engineer after previous association with Westinghouse. His early work involved miniature gyro compasses and stable elements. Later he was promoted to Head, Computer Development, a post he held from 1954 to 1958. Dr. Litman holds patents on several inventions at Arma and is a frequent contributor to technical publications. Wen Chow came with Arma in 1951 as a senior engineer in computer studies. Earlier he was with General Electric and held instructorships with MIT and New York University. Born in Shanghai, China, he graduated from the University of Nanking and later from MIT after moving to the United States. Mr. Chow became head of the 107A Computer Section in early 1956 and was largely responsible for development of computers used in the Arma all-inertial guidance system now in production for long range Air Force ballastic missiles. Before his promotion, he was Project Head, Computer and Systems.

ELLIOTT TURBOCHARGERS

help increase pipeline pumping capacity 40%



This interior view of a typical compressor station of Natural Gas Pipeline Company shows the line of existing horizontal gas engines on the left. The Elliott turbochargers on the right were enclosed in an extension of the building.

Natural Gas Pipeline Company of America was faced with the problem of increasing throughput capacity of existing pipelines. The economical solution of the problem included the application of Elliott turbochargers to 72 existing horizontal engines in nine compressor stations along the line from Texas to Illinois.

Engines originally designed to develop 1250 hp are producing 1800 hp when turbocharged. Benefits, in addition to more than 40 per cent power increase, include lower fuel consumption per horsepower and savings in operating and maintenance costs.

ELLIOTT Company
Turbocharger Department
Jeannette, Pa.

No other turbocharger manufacturer has as much experience covering the whole field of turbocharged engines as has Elliott Company.

MD-1

CARO, MICHIGAN AND GREAT BEND, KANSAS WIN THE DIESEL PROGRESS AWARDS FOR 1958

BACK in 1956, the Caro, Michigan plant of the Thumb Electric Cooperative of Ubly, Michigan won the DIESEL PROGRESS efficiency award for that year, and details of this fine plant appeared in our May, 1957 issue. Later on we will give you up-to-the-minute data on this installation because it has won the DIESEL PROGRESS efficiency award for the second time, for plants of 5,000 kw and under, for the year 1958. The Caro plant took a sabbatical leave for the year 1957 as required by the Rules of the Contest, which requires the winner of each group to stand aside for the year following their win. Then they come back into competition the following year.

The DIESEL PROGRESS efficiency award for plants of 5,000 kw and over for 1958 was won by the Great Bend, Kansas plant of the Central Kansas Electric Cooperative. Details of this installation appear on Pages 24, 25, 26, 27 and 28 of this issue.

The large bronze plaques commemorating these two awards were presented by your Editor, Rex W. Wadman, on April 6th to Mr. Murlen Cole, Production Superintendent of the Great Bend plant, and to Mr. Orville Hurford, Manager of the Caro, Michigan plant. This presentation was made during the morning sessions of the REA Managers' Meeting at the Hilton Hotel, Albuquerque, New Mexico.

As we mentioned above, the Caro plant was described in the May, 1957 issue to some length, but to refresh your memory, the Thumb Electric Cooperative of Ubly, Michigan, constructed the Caro plant in 1949. Originally two Cooper-Bessemer engines were installed, both rated at 1313 kwh—1850 hp capacity. They were first energized October 6, 1949. A third Cooper-Bessemer engine of the same rating was installed and put on the line June 6, 1952.

Up there in the Thumb of Michigan is located one of the oldest and most successful REA organizations in the country—the Thumb Electric Cooperative at Ubly, Michigan, known as Michigan 37. Located north and east of Flint and almost due east of Bay City is the territory covered by the Thumb Electric. The initial plant at Ubly was put on the line in 1938 with three Fairbanks-Morse diesels rated at 2102 kw and then in 1947 a 980 kw F-M was added, giving the installed capacity at Ubly of 3082 kw. The Caro plant is about 40 miles south and west of Ubly and as mentioned above, has an installed capacity of 3939 kw. All three Cooper-Bessemer engines are turbocharged and are rated at 327 rpm and each has a bore of 15½ in. and a stroke of 22 in.

The aftercooling of the turbochargers on these three Cooper-Bessemer engines is very important because all three units are working on a high-load factor and need every ounce of power they can produce. The aftercoolers, as might be expected, are Young Radiator units which are found on so many Cooper-Bessemer diesels, dual-fuel and natural gas engines. The principal equipment, which always proves interesting to our readers

Plants Under 5000 KW

	Caro	Jackson	Ulysses	Winchester	Burnips
Gross MKWH	19881	17883	16060	17895	9988
Plant Factor %	57	41	39	64	63
RPC %	74	68	67	91	83
Production Expense Actual	10.86	7.32	5.53	7.71	9.65
Production Expense Adjusted	6.66	7.00	7.60	7.86	8.24

because the success of a diesel power plant depends so much on the selection of good accessory equipment, is listed herewith.

One of the interesting parts of this very finely kept plant is the machine shop over in one corner, well lighted, well equipped. A Merlin centerless grinder which has proved so useful down at the Hersey, Michigan plant and other REA installations is here. This Merlin unit materially reduces the cost of maintaining the injection equipment on these engines. A great deal of credit goes, of course, to Orville Hurford, who is the Manager of the Coop, but the man who has brought this plant up to prize-winning efficiency is Don H. Decker, the Chief Engineer, whom you will see in the operating personnel photograph.

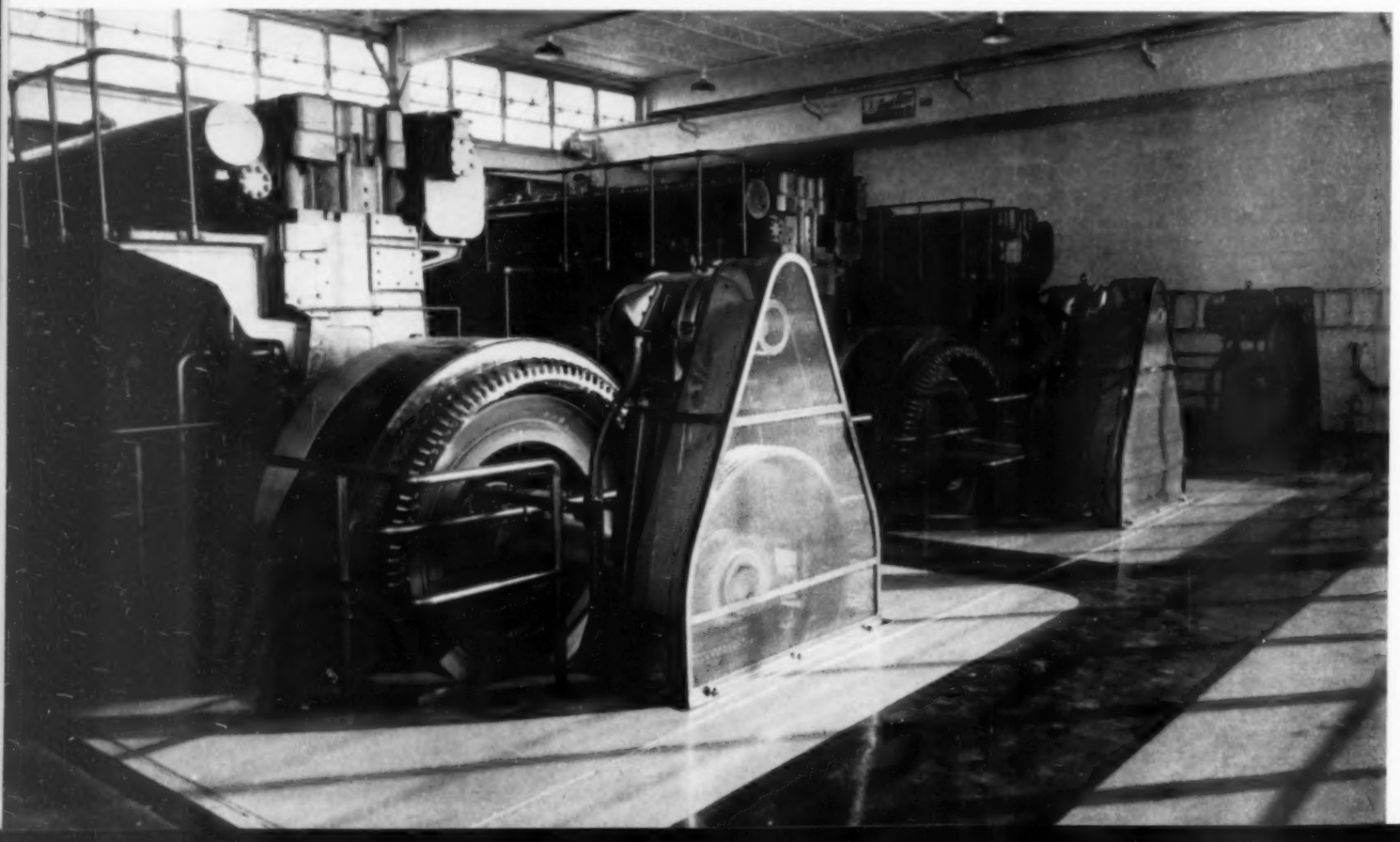
Our congratulations again go out to this hard-working crew—you have to work to keep ahead of these other REA plants in their competition to win this bronze plaque which they take pride in attaching to the front of their building and polishing it like an apple every week.

Plants Under 5000 KW

Cooperative Name	Plant	KW
Thumb Electric Cooperative Ubly, Michigan	Caro	3939
Federated Rural Electric Association 310 Sherman Street Jackson, Minnesota	Jackson	4920
The Pioneer Cooperative Association, Incorporated Box 527 Ulysses, Kansas	Ulysses	4663
Illinois Rural Electric Company Winchester, Illinois	Winchester	3200
Wolverine Electric Cooperative, Incorporated Big Rapids, Michigan	Burnips	1805

The list above covers the five REA plants of 5,000 kw and under which came closest to Caro in the competition for the year 1958. Production costs have in each instance been adjusted to the fuel cost of 40¢/mm-Btu. It should be remembered that each year the winning plant in each group retires to the sidelines for the next year and then comes back into competition, with the exception of

The Caro, Michigan plant of the Thumb Electric Cooperative of Ubly, Michigan, showing the three Cooper-Bessemer turbo-charged units directly connected to Elliott generators and exciters.



List of Equipment

Engines	three 1850 hp. LS-8-T Cooper-Bessemer turbo-charged 15½" x 22", 8 cyl. 327 rpm, rated at 1313 kw.
Generators and Exciters	Elliott
Fuel Oil Filters	Hilco and Nugent
Fuel Oil Transfer Pump	Roper
Lube Oil	Sinclair H.D. #40
Lube Oil Filter	Hilco
Lube Oil Reclaimer	Hilco
Heat Exchanger	Ross
Air Intake Filter	Air-Maze
Exhaust Muffler	Maxim
Exhaust Pyrometer	Alnor
Governor	Woodward
Air Compressors	Quincy
Turbocharger Aftercoolers	Young
Consulting Engineers	J & G Daverman, Grand Rapids, Michigan

the Hersey plant of the Wolverine Electric Cooperative, Inc., which has already won this award three times and by the Rules of the Contest, no longer competes. This Rule, of course, will apply to any other R.E.A. plant winning the plaque three times.

Growth of kwh Demand

1950	8,829,200
1951	10,966,400
1952	11,961,200
1953	14,397,000
1954	16,500,900
1955	20,403,200
1956	22,648,100
1957	21,243,600
1958	19,881,200

The fuel oil used through 1958 was No. 3 Diesel Fuel and 1,384,768 gallons were consumed at a cost of $158,635.13. The fuel consumption gave an average kwh/gal. of fuel of 14.35 and a btu/kw of 97.27 Sinclair H.D. #40 was used through the year on all three engines with lube oil consumption of 3512 kwh/gal.

Much of the credit for the highly efficient operation of the Caro, Michigan plant belongs to the men above. Left to right: Orville Hurford, Manager; Russell West, Maintenance Man; Merrill Hagen, Operator; Don H. Decker, Chief Engineer; William Schulze, Anthony Knoll, and Earl Boitel, Operators.

GREAT BEND, KANSAS

The Great Bend Plant of the Central Kansas Electric Cooperative, Inc. Wins The DIESEL PROGRESS Award for Plants Over 5000 KW

By THOMAS C. KIRKWOOD*

WINNER of the 1958 Diesel Progress Class B Award for high operating efficiency is the Great Bend plant of the Central Kansas Electric Cooperative, Inc. This REA-financed co-operative is located in the central part of Kansas in what is often referred to as the "oil capital in the heart of the wheat belt". And this very aptly describes the area served by CKECI, where oil and agricultural expansion have led to a quadrupling of the plant demand over the past ten years. At the same time, there has been an even greater growth in net generation, with 1958 production about five times that of 1949.

The plant is located on a tract owned by CKECI immediately west of Great Bend. Originally two miles from the city limits, extensive growth in Great Bend has brought these limits to the plant location. Also situated on the same ground with the generating plant and substation are the Co-operative's headquarters building, warehouse, garage, pole yard, and radio facilities. Although this is not the geographical center of the Cooperative's service area, the plant is well located with respect to the electrical load. CKECI serves loads in nine central Kansas counties, with a territory embracing approximately 5,000 square miles. In this territory are some 4500 consumers including farm homes and farm irrigation; residences, public buildings, and commercial establishments in small rural communities; and public street and highway lighting and a number of diversified industrial and commercial enterprises. Energy is distributed to the area by means of 110 miles of 69 kv and 44 kv transmission lines and 2,836 miles of rural distribution lines.

Of course, the power plant is the primary facility on the Cooperative's property, and is therefore located so as to allow easy future expansion of the generating facilities. The building is of brick construction, an economical material due to its manufacture in local plants, except that the east wall is of aluminum paneling which can be removed and re-used should the building be extended. The west half of the building, housing the four Worthington engines, consists of an operating floor with switchgear and auxiliary bays, using trenches for interconnecting piping. The latest extension, for the Baldwin-Lima-Hamilton engines, is necessarily larger and includes a full basement. An interesting feature of this construction is the heavy continuous mat under the engine foundations and the water-tight wall construction, all specifically designed to withstand the conditions of high ground water level. Space is available in the existing building for one additional unit.

Partner, A. C. Kirkwood & Associates

The step-up substation is located just to the west of the generating plant building, and includes 17,250 kva in transformer capacity serving 12.5 kv distribution and 69 kv transmission circuits. This substation is supplied from the generating plant, with three Worthington engines connected in a unit generator-transformer arrangement to the 12.5 kv substation bus (taking advantage of transformers available as a result of substation modifications during the last construction program). One 1160 kw generator and the two 3100 kw generators are connected to General Electric indoor metal-clad switchgear, from which feeders run to the substation transformers connecting to both the 12.5 kv and 69 kv buses. Also included in the sub-station is a 1000 kva tie to another utility, existing only for emergency conditions. The first two engines were placed in service in 1947. This was approximately six years after the Cooperative had begun service, purchasing its power requirements in those early years. These units are Worthington SEHGO-8, 16 x 20, 360 rpm, four-cycle, dual fuel engines rated 1440 hp with 1000 kw Westinghouse generators. As a matter of interest, these were among the earliest dual fuel installations for electric generation in the country. As the system load grew it became necessary to install two additional units, these being similar to the first engines except with ratings increased to 1645 hp and 1160 kw. These units went into operation in 1950.

A third major expansion was decided upon following an engineering study made in 1952. This study compared several methods of increasing the power supply, including purchased power, installation of steam turbines and further installation of dual fuel engines. Due to the past and projected future rapid load growth, this project also included two generating units, but of a much larger size. Each unit is a 9-cylinder, 21½ x 27½, 257 rpm, two-cycle Baldwin-Lima-Hamilton engine driving a 3400 kw Electric Machinery generator. The type G-921-SA engine has a gross rating of 4800 hp and, with scavenging air supplied from a motor driven centrifugal blower directly connected to the generator terminals, a net rating of 4350 hp. This re-

REA Plants 5000 KW and Over

Cooperative Name	Plant	KW
Lea County Electric Cooperative P. O. Box 98 Lovington, New Mexico	Lovington	20,030
Wolverine Electric Cooperative, Incorporated Big Rapids, Michigan	Hersey	10,065
Central Kansas Electric Cooperative, Incorporated Box 188 Great Bend, Kansas	Great Bend	10,520
Wheatland Electric Cooperative, Incorporated 512 South Main Street Scott City, Kansas	Jess Taylor	9,380
Illinois Rural Electric Company Winchester, Illinois	Pittsfield	8,970

Plants 5000 KW and Over

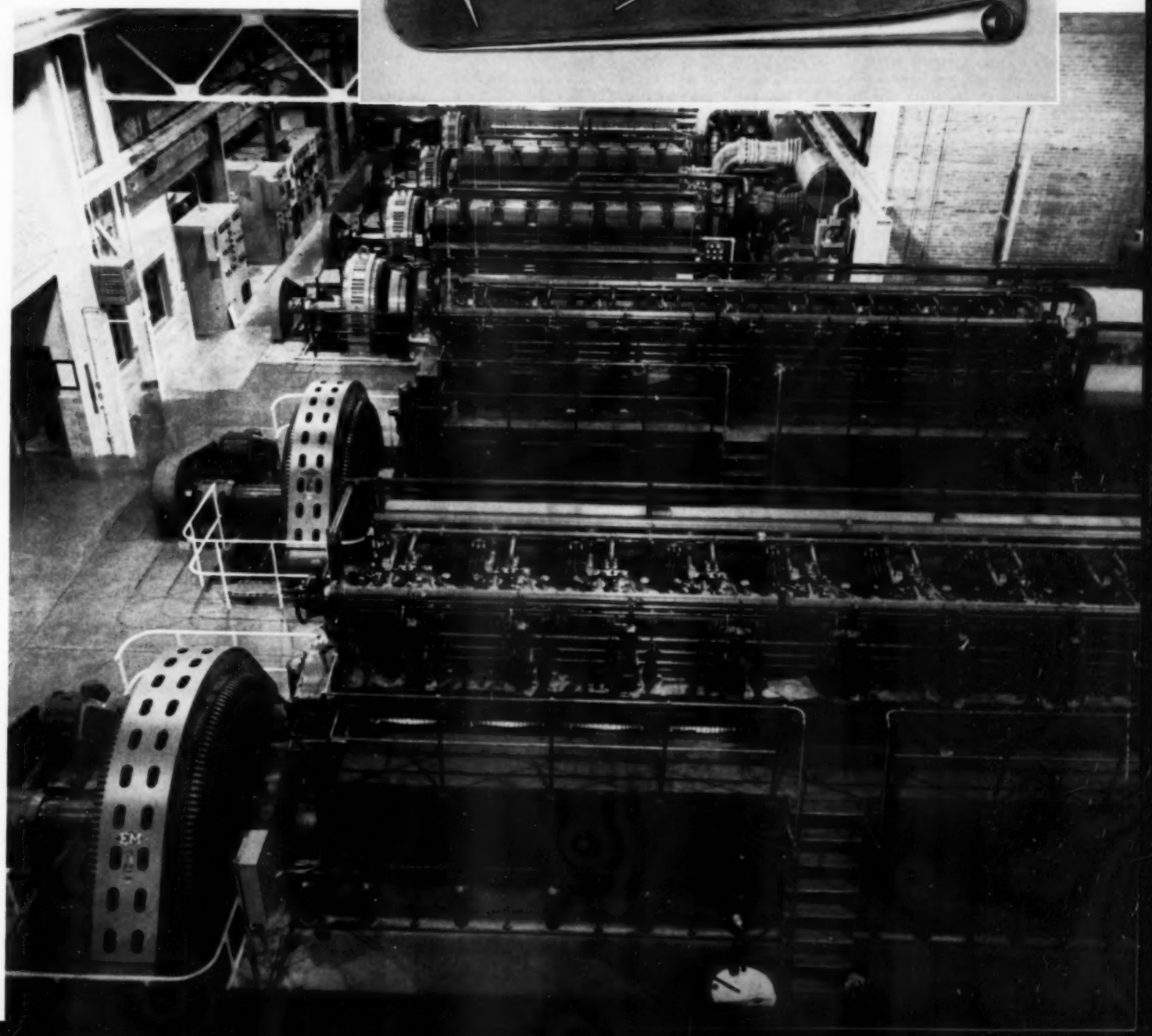
	Great Bend	Lovington*	Hersey**	Scott City	Pittsfield
Gross MKWH	45,228	73,329	54,391	36,727	30,671
Plant Factor %	49	42	62	45	39
RPC %	81	84	87	71	78
Production Expense Actual	4.06	3.69	7.14	4.81	7.10
Production Expense Adjusted	5.69	5.25	5.49	6.10	6.56

*Lovington won in 1957 so was out of the competition for 1958.
**Hersey has won the plaque three times so is entirely on the side lines.

LOAD GROWTH

Year	Net Generation KWH
1949	8,716,330
1950	13,318,080
1951	17,795,400
1952	20,763,000
1953	25,359,000
1954	28,339,000
1955	33,975,000
1956	39,018,000
1957	37,974,000
1958	44,168,000

General view of the engine room at Great Bend, Kansas, with the two Baldwin-Lima-Hamilton engines in the immediate foreground with their Electric Machinery generators and exciters. Adjoining them are the four Worthington units with their Westinghouse generators and exciters.



The crew responsible for the fine record made by the Great Bend plant in 1958, as they stand in front of one of the Baldwin-Lima-Hamilton engines. Left to right: Bernard Musenbrock, Asst. Operator; Kenneth Brack, Maintenance Engineer; Virgil Schraeder, Asst. Operator; Thomas Means, Plant Operator; Jack D. Goodman, Manager of Coop.; Kenneth Ault, Plant Operator, Murlen Cole, Production Supt., Leroy Krallman, Plant Operator; Virgil Stoecklein, Plant Operator.

sults in a net generator rating of 3100 kw. These units were placed in operation in 1954, and a detailed description of the installation was given in the April 1955 issue of DIESEL PROGRESS.

Accompanying this article is a table showing operating data for the award-winning year of 1958. It is interesting to note that the accumulated service for each of the four Worthington engines is nearly equal, and the same applies for the two BLH engines. In 1958 approximately two-thirds of the total generation was supplied by the two larger units, and the remaining one-third by the four smaller engines. Several indicators of economical station operation appear in this tabulation. These include the low station service factor, which is well below the average for most plants and is consistently in this range through the years. The good system load factor is the result of a continuous sales promotion effort on the part of the management, and since the 1958 demand nearly equalled the plant capacity, the plant factor is also high. The high RPC factor reflects the unit loading schedule which calls for operation at approximately 90 per cent of rating. Of course, this is an economical load point for the engine while at the same time resulting in a minimum number of units operating.

The maximum plant demand in 1958 was 9000 kw, occuring in September, and minimum loads ran about 4000 kw in the winter and 5000 kw in the summer. The plant heat rate was a very satisfactory 10,100 Btu per kwh, this being computed on a gross basis. Plant lubricating oil consumption was also very satisfactory, with no great variation between individual units. The total production expenses, which include plant supervision and engineering, station labor, fuel, lubricating oil, other supplies, and all maintenance costs, averaged 4.06 mills per kwh. On the adjusted basis for the DIESEL PROGRESS Award, using a fuel cost of 40 cents per million Btu, the production expense was 5.69 mills per kwh. The generating units were available for service 96 per cent of the hours during the year, with a total of only 2,134 hours out for maintenance for all six units.

1958 OPERATING DATA

Unit No.	HP	KW	Hours Operated 1958	Hours Operated To Date	Gross Generation KWH
1	1440	1000	3682	52,139	3,440,000
2	1440	1000	3578	53,559	3,326,000
3	1645	1160	4951	54,754	4,622,000
4	1645	1160	4149	53,215	3,693,000
5	4350	3100	6125	23,506	14,945,000
6	4350	3100	6202	22,413	15,202,000
Total		10520			45,228,000
Station Service, KWH					1,060,000
Net Generation, KWH					44,168,000
Maximum Demand					9000 KW
Load Factor					57.4%
Plant Factor					49.1%
Running Plant Capacity Factor					80.7%
Station Service Factor (Percent of Gross)					2.3%
Station Heat Rate, BTU per KWH					10,100
Lubricating Oil Consumption (HPHrs. per Gal.)					6,747
Production Expense, Mills per KWH, actual					4.06
Production Expense, Mills per KWH, adjusted					5.69

It is interesting to note from the following tabulation of plant production expense and plant heat rate during the past four years that both factors have decreased. This reflects the continuing efforts of the plant personnel to improve operations, and incidentally indicates that with proper operation the equipment efficiency certainly does not decrease with age. The four-year record shows the following:

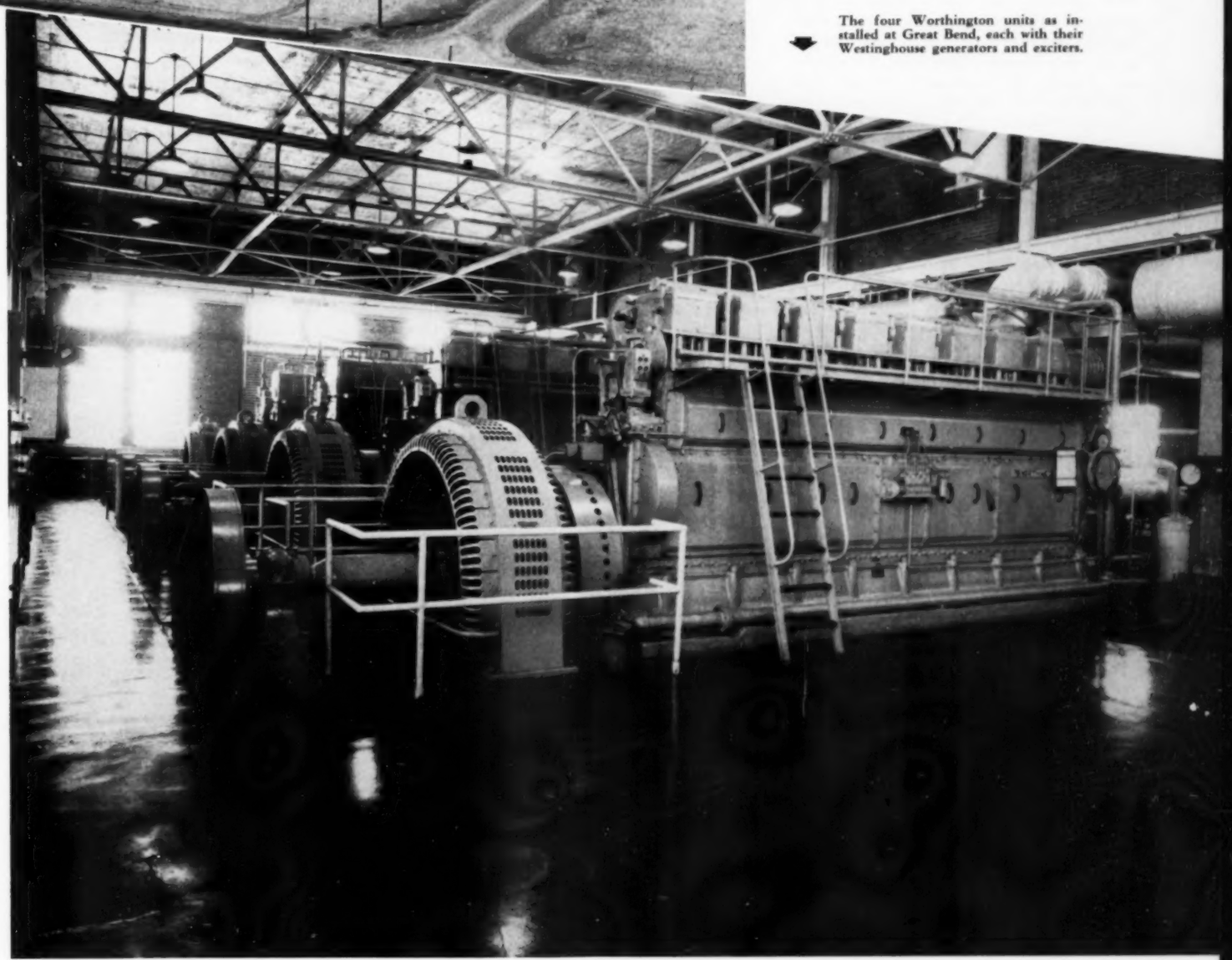
Year	Production Expense Mills per KWH	Plant Heat Rate Btu per KWH
1955	4.78	10,255
1956	4.39	10,909
1957	4.53	10,341
1958	4.06	10,100

The Cooperative is owned by those receiving service, and these consumers elect a Board of Trustees to determine the policies of the organization. The actual operation is under the direction of its Manager, Mr. Jack D. Goodman. Under him are three divisions of operation, headed up by the Production Superintendent, Office Supervisor, and General Superintendent. The latter is in charge of all outside work on lines, transformers, services, etc. Of course, the Office Supervisor is responsible for billings and collections, as well as for general office operations. Staff services to the Manager are supplied by the system Engineer and the Coordinator. Professional services as needed are supplied by the Cooperative's attorney and also its consulting engineer. Engineering for the last two plant construction programs, as well as for other services, has been the responsibility of A. C. Kirkwood & Associates, Kansas City, Missouri.

The Production Superintendent, having direct control of the generating plant, is Mr. Murlen

Cole. His staff includes a maintenance engineer and six plant operators and assistants. Working under policies set by the Board and the general direction of the Manager, Mr. Cole is responsible for the high degree of operating efficiency developed by the Great Bend plant. He firmly believes that a strict preventive maintenance schedule is not a substitute for continual close scrutiny of the plant operation. Although certain inspections (such as bearing, valves, turbochargers, etc.) are made on

This is the bird's-eye view of the Great Bend, Kansas REA plant with generating plant in the foreground housing the four Worthington units and the two Baldwin-Lima-Hamilton engines. Cooling towers to the rear with fuel oil storage tanks behind them. Administration Building is to the extreme right.



The four Worthington units as installed at Great Bend, each with their Westinghouse generators and exciters.

a regular basis, no maintenance work is deferred when a contrary need is indicated by operator observation. Mr. Cole keeps a regular log of plant efficiency data, such as lubricating oil consumption and heat rates, for each individual unit. Furthermore he believes that good maintenance and economical operation can only be obtained in a clean plant, with the result that the Great Bend plant is not only efficient, but also spotless.

The plant and system of this Cooperative have had to face many problems and adversities, but probably none have been as great as the terrific late winter storm which hit the system in March, 1957. This storm, which seemed to develop to its worst proportions in the CKECI service area, greatly disrupted the Cooperative's system as well as those of other electric and telephone utilities in this immediate area. A treacherous combination of sleet, snow, falling temperatures and extreme wind devastated overhead lines in this area. When it was over the only load on the Great Bend plant was the plant itself and the Cooperative's headquarters. The total damage reached nearly $1,000,000; as an indication of the tremendous re-building job required, the Cooperative had to replace nearly 10,000 poles. With thirteen line construction contractors plus emergency crews from other cooperatives working on the system, 70 per cent of the consumers were back in service within three weeks and the job was completed within another three weeks. The effect of this storm is reflected in the decreased generation in 1957 as compared with 1956, and the corresponding slight rise in production expense. Also adversely affecting production in 1957 (and 1958) was the low irrigation load resulting from above-normal rainfall.

As a result of the combined efforts of the many people associated with the construction and operation of this point, and through the continual vigilance of the management and operating personnel, it has been possible to meet the area's rural load requirements in this efficient manner. Significant indicators of economical operation, such as low station power requirements, good load factor, and high running plant capacity factor all show why the Great Bend plant has won this award for operating efficiency.

List of Equipment for Baldwin Engines

Engines	Baldwin-Lima-Hamilton, 4800 gross hp @ 257 rpm, bore 21½ in stroke 27½ in.—Two
Generator and exciters	Electric Machinery 3400 kw.
Fuel oil booster pump	Worthington
Fuel oil filter	Briggs
Lube oil	Sinclair on one. Texas URSA on other
Lube oil cooler	Ross
Batch lube oil purifier	Sharples
Lube oil filter	U. S. Hoffman Orifice Type
Lube oil strainer	Zurn
Jacket water pumps	Peerless & Worthington
Jacket water cooler	Ross
Jacket water thermo-control valve	Fulton Sylphon
Cooling tower	Marley
Cooling water pumps	Fairbanks-Morse
Intake air filter	American Air Filter
Aquatowers	Marley
Intake air aftercooler	Young
Intake air vibration joint	Garlock
Scavenging air blower	Roots-Connersville
Exhaust silencer	Burgess-Manning
Exhaust expansion joint	Badger
Switchgear	General Electric
Substation addition	Westinghouse
Crane	10 ton Manning-Maxwell-Moore
Thermometers & gauges	Ashcroft
Air compressor	Quincy
Gas meters	Roots-Connersville
Gas regulators	Reynolds
Pyrometer	Alnor
Governor	Woodward
Mechanical lubricators	Madison-Kipp
Piston rings	C. Lee Cook
Engine bearings	American Bearing Corp.

List of Equipment With Worthington Engines

Engines	Worthington SEHGO8, 16" Bore x 20" Stroke, 360 rpm Dual Fuel, two rated 1440 HP, two @ 1645 HP.
Generators	Westinghouse 1000 and 1160 kw, 4160/2400 v, 3 phase, 60 cycle
Exciters	Westinghouse 15 and 20 kw, 125v, 1750 rpm.
Exciter Drive	Worthington V-belt
Engine Alarms	Viking
Fuel Filters	Briggs
Lube Oil	Sinclair
Lube Oil Filters	Honan Crane
Turbo Oil Filters	Nugent
Governor	Woodward
Lube Oil Cooler	Struthers Wells
Jacket Water Cooler	Struthers Wells
Pyrometer	Alnor
Gas Meters	Rockwell EMCO
Exhaust Silencer	Maxim MUC
Intake Air Cleaner	Air Maze
Gas Regulators	Fisher-Reynolds
3-Way Valves	Trerice
Fuel Oil Meters	Worthington
Starting Air Compressors	Worthington
Jacket Water Pumps	Worthington
Pressure Gauges	Marsh
Switchgear	Westinghouse
Voltage Regulators	Westinghouse

General view of the Administration Building at Great Bend, Kansas of the Central Kansas Electric Cooperative.

DIESELS SPEED URANIUM MINING IN WYOMING

By L. H. HOUCK

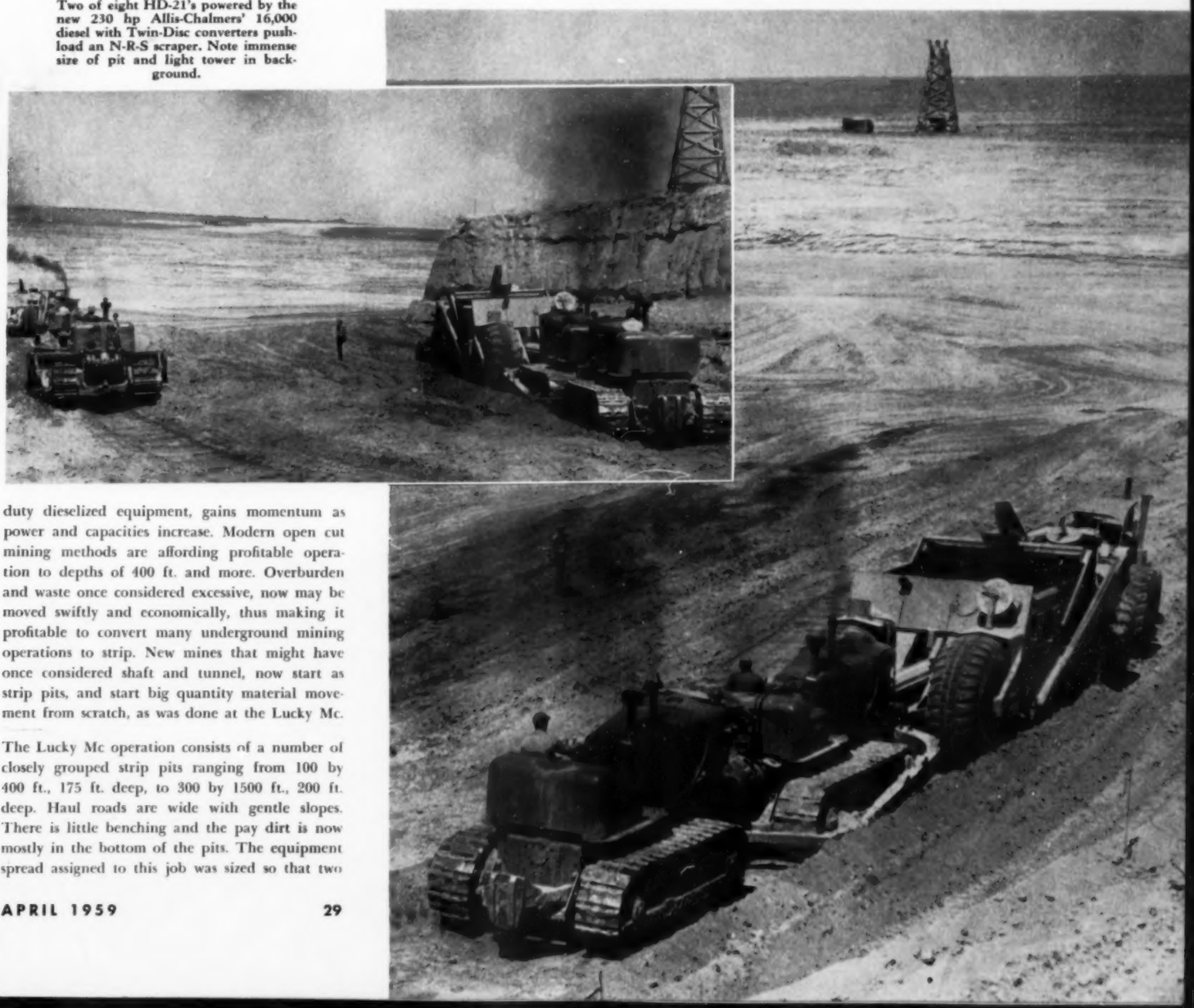
IN an isolated mile-high section of western Wyoming, 60 miles from a conventional highway, where the long shadows of the Rattlesnake mountain range reach to Poison Spider Creek, Utah Construction Co. of San Francisco is setting a hot pace in excavation at the Lucky Mc open pit uranium mine.

Here is more proof that modern diesel-driven heavy duty excavating equipment is reliable and can be operated at top profitable capacity many miles from a supply base. Utah Construction, using its new field-tested preventive maintenance program, has also proved conclusively that such equipment can be maintained in top operating condition regardless of remote location—a necessity in today's highly competitive construction industry. The revolution in mining, sparked by heavy-duty dieselized equipment, gains momentum as power and capacities increase. Modern open cut mining methods are affording profitable operation to depths of 400 ft. and more. Overburden and waste once considered excessive, now may be moved swiftly and economically, thus making it profitable to convert many underground mining operations to strip. New mines that might have once considered shaft and tunnel, now start as strip pits, and start big quantity material movement from scratch, as was done at the Lucky Mc.

The Lucky Mc operation consists of a number of closely grouped strip pits ranging from 100 by 400 ft., 175 ft. deep, to 300 by 1500 ft., 200 ft. deep. Haul roads are wide with gentle slopes. There is little benching and the pay dirt is now mostly in the bottom of the pits. The equipment spread assigned to this job was sized so that two and three of the pits can be in production at the same time. The formation is abrasive and usually dusty presenting a test for power in use of scrapers and its own form of punishment for equipment with an abrasive atmosphere that requires constant attention to filters and seals. Some of the formation requires blasting but the bulk of production is excavated with big diesel scrapers push-loaded by a pair of crawler tractors in tandem.

The scraper fleet includes 5 Caterpillar 18 cu. yd. DW-20's, powered with Caterpillar D337 diesels, equipped with Donaldson air cleaners and Commercial fuel filters. There are 5 M-R-S 26 cu. yd. scrapers, powered with Cummins NHT-6-BI diesels which use Fram fuel filters and air cleaners. This 10-unit fleet of scrapers has a capacity in excess of 220 cu. yds. per loading cycle. To push-load this fleet of big capacity scrapers requires a concentration of diesel power. Main performers in pushing is a fleet of eight of Allis-Chalmers' largest crawlers—HD-21's using the 16,000 diesel rated 230 hp and Twin Disc torque converters. Besides the HD-21's there are two Caterpillar tractors, the largest D9 with a Twin Disc torque converter and a D8 with straight transmission. The D9 diesel is rated at 320 hp.

Latest addition to the dirt moving equipment is the largest dozer on rubber, the huge Clark 104,000 lb. 480 Michigan, powered with a VT-12 600 hp Cummins diesel. It has all-wheel drive, Clark 4-speed power shift transmission with Clark torque converter, power steering and planetary wheel axles. Besides its top pushing ability, this machine has two interesting features. Its four wheels and



Two of eight HD-21's powered by the new 230 hp Allis-Chalmers' 16,000 diesel with Twin-Disc converters push-load an N-R-S scraper. Note immense size of pit and light tower in background.

tires are identical and are interchangeable and its dozer blade has all the dexterity of a man with a shovel. Hydraulically controlled from the driver's seat, the operator can pivot the dozer blade forward or back, tilt side to side, or raise it up or down. Another machine on rubber that has proved ideal for its job is a Clark Michigan 175 with JT-6-BI Cummins diesel and Clark transmission and torque converter. This is a 2¾ cu. yd. tractor shovel used for loading trucks. A couple of Allis-Chalmers front end loaders are also assigned to loading. One is an HD-16-G, 146 hp diesel, Twin Disc torque converter, and a 3 cu. yd. bucket capable of loading to a dumping height of 12 ft. 3 in. The other is an Allis-Chalmers diesel HD-11-G with a 2½ cu. yd. bucket.

For handling shot rock and for use in other pit locations not adaptable to scraper operation, there are four power shovels. Assigned to this important job is an 80-D Northwest 2½ cu. yd. shovel, powered with a Murphy diesel, and two model 6 Northwest 1½ cu. yd. shovels, likewise Murphy diesel powered and a model 655 P. & H. 1½ cu. yd. shovel, powered with a Caterpillar D13000 diesel. The output of scrapers and shovels, along with assists from the big dozers, presents a formidable hauling job, which is efficiently handled by 19 big dump trucks. Fourteen of the 19-unit fleet, are Kenworth type L-924, end dumps, hauling 11 cu. yds. heaped and powered with Cummins NTO-6-B diesels. Driving axles are Timkin and transmissions are 10-speed Spicer with Spicer manual clutches. The remainder of the dump truck fleet consists of five Euclid end dumps, type 36TD, 14 cu. yd. capacity, and powered with NHRBIS Cummins diesels, which deliver 300 hp at 2100 rpm. These trucks are equipped with Allison transmissions—TC-644-1's and TG-607's. Loaded trucks check through one of several check towers before unloading, where a towerman probes the load with a Geiger counter, records the reading and takes a shovelful sample for the laboratory. The Geiger reading indicates disposition—mill, or a particular stockpile.

A $7,000,000 concentration plant is part of the Lucky Mc operation. The mill runs three 8 hr. shifts per day and the mining operation runs two

8 hr. shifts per day, 6 days per week. Some of the other equipment assigned to the Lucky Mc includes 16, 3½ to 5 kw Kohler light plants, a number of diesel air compressors, a Euclid 43FDT dump with 6-71 GM diesel, converted to a 6,100 gal. sprinkler for keeping dust down on haul roads. While electric power for mill and camp and maintenance shop comes from REA it is necessary

Cummins powered Kenworth dump truck, checking with test tower. Man is probing load with a Geiger counter.

Left to right: S. A. Hottman, superintendent of mining; H. E. McNally, area superintendent for Utah, Wyoming, Colorado and other Rocky Mountain states; and I. A. McClure, master mechanic, Utah's Lucky Mc.

M-R-S 28 cu. yd. scrapers, powered with Cummins diesels and equipped with Fram filters and air cleaners, take a PM break at the Lucky Mc uranium mine.

80-D Northwest 2½ cu. yd. shovel with Murphy diesel power, stops for refueling. Note depth of pit and absence of benches.

Biggest dozer on rubber—Clark's 480 Michigan with Cummins V-12 600 hp engine, pauses in shop for filter changes and routine PM maintenance. Mechanic above rear wheel is changing filter.

to have two standby diesel electric plants. For camp standby there is a Caterpillar type D397, 350 kw generator set and for mill standby there is a Twin GM 6-71 with a 200 kw generator.

Here at Lucky Mc is one of the smoothest running maintenance setups to be found anywhere which insures continuous high production. A new PM system developed and field-tested and originated in the San Francisco office, was installed about a year ago. This new system, along with well equipped shops and highly skilled and trained personnel, has reduced maintenance cost and increased production. Key to the new and original PM system is a loose-leaf book compiled in the main office in San Francisco for each piece of equipment. This book contains all the vital statistics of the equipment from the date acquired from vendor to the day it is retired. The book stays with the unit and moves to a new location when the unit moves and a unique characteristic of the new system is that a strange crew at a far distant job can take up maintenance and repair where the other crew left off, by using the PM book.

Use of the book ends scraping off number plates and engine numbers. It gives all pertinent serial numbers, under and oversizes, exact details of previous work or overhauls, parts names and numbers, specified accessories such as filters and seals plus a record of elapsed hour-time and operations completed at specified hours. At Lucky Mc, which is charactertistic of all Utah jobs, Master Mechanic I. A. McClure has a library of PM books representing the equipment in his charge on top of his desk. One man in his office has charge of the records to make sure that all operations are performed and entered in the books. Field service shop at Lucky Mc is a 50x125 ft. steel building, providing shop space, parts department and small office. Actually at work making a go of the PM system besides the shop crew of mechanics, are two teams of a mechanic and a helper for each mine work shift. Each team has appropriate tools in a truck equipped with winch and A frame. Another mechanic on each shift works in the field checking 100-hr. service and spotting any needed unreported repair jobs which are then scheduled for shop or repaired immediately in the field. The theory of a "stitch in time" is in full force. Lube work is carried out by other crews. Work is so spaced that the full 14-man mechanical crew works on Sunday when all the equipment is available, since the mine is shut down.

At Cedar City, Utah, Utah Construction operates an iron ore open pit mining job. The main pit is half a mile long and 700 ft. wide and has a projected depth of 400 ft. Four 6 to 8 cu. yd. electric shovels load the rock into a 23 unit fleet of Euclid dumps. This fleet consists of 14 Euclid 2FFD's with NVH-B1 Cummins diesels, three Euclid 1FFD's with GM diesels and three 4FFD's with Cummins, four 7LD's with Allis-Chalmer's and a LeTourneau-Westinghouse LW 32 with NST Cummins. Tractors include an Allis-Chalmers Diesel HD-16, and three Caterpillar 15A's with 342 diesels. A P & H shovel, model 955, with Caterpillar D337 diesel, assists in loading. Upkeep and PM methods use the identical system described for Lucky Mc and results have been equally good.

Company-wide control of the PM system is accomplished through the cooperation and coordination of two complementary departments within Utah Construction. The equipment department is responsible for ownership and operating costs, location, movement authorization, equipment acquisition and disposal. Maintenance and repair of equipment on all projects, as well as operation of storage yards, is the responsibility of the mechanical department. Mr. L. C. Irwin, is manager of the equipment department with his office in San Francisco and D. F. Anderson is equipment superintendent. In the field, project managers or superintendents are responsible for the successful operation of the preventive maintenance program. Area superintendents help in carrying out the PM program by acting as consultants, disseminating ideas and helping master mechanics solve specific problems. Our guide in assembling this information and in our visit to Lucky Mc was H. E. McNally, who is area superintendent with offices in Salt Lake City. He supervises the Utah equipment spreads in Utah, Colorado, Wyoming and other Rocky Mountain states.

BLUE EYED INDIAN RIDES IN STYLE

Navajo Freight Lines, A Denver Headquartered Firm, Uses Modern Equipment and Facilities to Provide First Class Service; Its Famous Trademark Covers Over 25 Million Miles Every Year.

HISTORIANS are not sure whether the Blue Eyed Indian really existed among the Navajo people. If he did, he probably transported various commodities from one reservation to another via the simple, crude travois. Today, however, the Blue Eyed Indian is the famous symbol and trade mark of the Navajo Freight Lines. And he rides the trail in the latest most modern diesel powered equipment. In fact, nearly all of Navajo's 300 line haul tractors are powered by diesel.

Navajo grew out of several small lines which merged in 1947 under the name of Navajo Freight Lines, Ind. In 1953, Laurence Cohen—a wealth of trucking experience behind him— became president of Navajo and moved its headquarters to Denver. With great enthusiasm and determination Cohen met the challenge of building Navajo into a great trucking company. Its authority extended from California to Chicago, and Kansas City and Omaha, with service in the states of Arizona, New Mexico, Colorado and Texas. During the following years, Navajo's Blue Eyed fleet grew rapidly. Navajo was granted authority to operate between Chicago, South Bend and Fort Wayne; between Amarillo, Wichita, Lubbock, Odessa and Hobbs; to Manteca and Stockton, Calif.; and to service Phoenix and Las Vegas. Today, the Navajo Reservation of some 75 terminals, agency stations, and sales offices includes 9000 miles of highway authority. Since 1953, new, modern terminals have sprung up in Chicago, Omaha, Albuquerque, Denver, Los Angeles, Gallup, Las Vegas, Nevada, Fort Wayne and Odessa. Today, nearly 2000 employees work as a highly specialized team to keep Navajo rolling 24 hours a day, 7 days a week and 52 weeks a year.

The roving Indian makes fast time covering his hunting grounds and a good part of the tribe's nation-wide reputation for fast, efficient service and round-the-clock dependability can be directly attributed to their diesel fleet. In its modern line equipment Navajo has Autocar, White Freightliner and International units with power predom-

A White Freightliner dromedary rig, equipped with NH 220 Cummins engine and Fuller R-96 RoadRanger transmission in front of Navajo's Denver general offices.

An International diesel tractor enters one of the company's maintenance pits for a check and inspection.

One of 12 International model DCOF-405 Cummins powered tractors recently added to the Navajo fleet. The company currently uses more than 100 diesel West Coast type Internationals.

inantly supplied by the Cummins NH 220 engine. Coupled with this powerplant are Fuller Road-Ranger transmissions and the latest type twin screw tandem axles on cab over and conventional tractors. Navajo uses the latest model air cleaners using dry pack paper type air filters and its fuel oil filters are of the sock and pack type. First class equipment implies first class service and it is said that, "Navajo offers the finest service over the shortest, fastest, Coast-to-Coast Route." In 1957, Navajo's diesel OTR tractors traveled 35½ million miles, a 92 per cent increase since 1953. Over the past five years, its diesels have rolled up an astounding 128,000,000 miles—equivalent to more than five times around the world. First class service could not be maintained week after week, month after month, year after year, without the aid of dependable diesels. Navajo's unique and intricate dispatch system and teletype network throughout the operational area coordinates all units. Each dispatcher has teletype control of all shipments. Thus, every dispatcher along the Navajo routes has detailed, accurate and complete information on trailers and freight movement. Since each dispatcher has a running tab of all shipments, he is able to coordinate them and assure super-fast pick-up and delivery service that is so famous with Navajo. Navajo's new Arrowflyte schedules provide special speed-treated L.T.L. shipments east and west, north and south.

the maintenance work must be done quickly, efficiently and skillfully. Each tractor eventually goes through five different checks. Each check, which occurs at prescribed miles, is designed for specific inspections, checks and repair work. A safety inspection, in compliance with I.C.C. Safety Regulations, is completed after every trip. By the final check, every tractor has been completely and thoroughly inspected and overhauled. Diesel tractors have spelled economy for Navajo both in low cost fuel and maintenance. Substantial fuel savings have been realized since the intervention of diesel power. Over the years, Navajo's diesel maintenance cost averages a low 2.4¢ per mile. Navajo drivers prefer the diesel dependability and handling ease. Their tractors provide them with thousands of trouble-free miles. Most of Navajo's tractors are equipped with two-man sleeper cabs. This eliminates unnecessary stops and results in a time-saving, continuous operation throughout the Navajo authority.

Maintenance man, dispatcher, executive, driver—the entire Navajo Tribe is geared to customer service. To do this, Navajo continually seeks better, more efficient methods of handling freight.

Robert Cohen (right), Executive Vice President of Navajo Freight Lines, offers peace pipe to a pretty "Squeezable Squaw," another appropriate Navajo symbol.

All of Navajo's equipment is continually checked and kept in perfect condition. This is accomplished through Navajo's comprehensive Preventive Maintenance Program. Basically, the system provides a continuous maintenance plan on all tractors. Each unit is sent through strategically located maintenance and repair shops at least five times each 100,000 miles. Navajo tractors average from 14,000 to 16,000 miles per month. Therefore, New terminals are being planned to keep pace with the ever growing industry. Equipment is kept modern by replacing the old units, and adding new tractors and trailers to the giant fleet. There is a pride evident throughout the vast Navajo Territory. A pride in the job that is being done; in the service that is being offered. And this pride can be seen on the face of The Blue Eyed Indian as he speeds along the highway.

UNINTERRUPTED POWER UNIT

Allis-Chalmers Introduces 10 KW "No-Break" Auxiliary Generator Set Incorporating Diesel Engine and Synduction Motor; Unit Designed for Applications Where Continuous Power Must Be Maintained

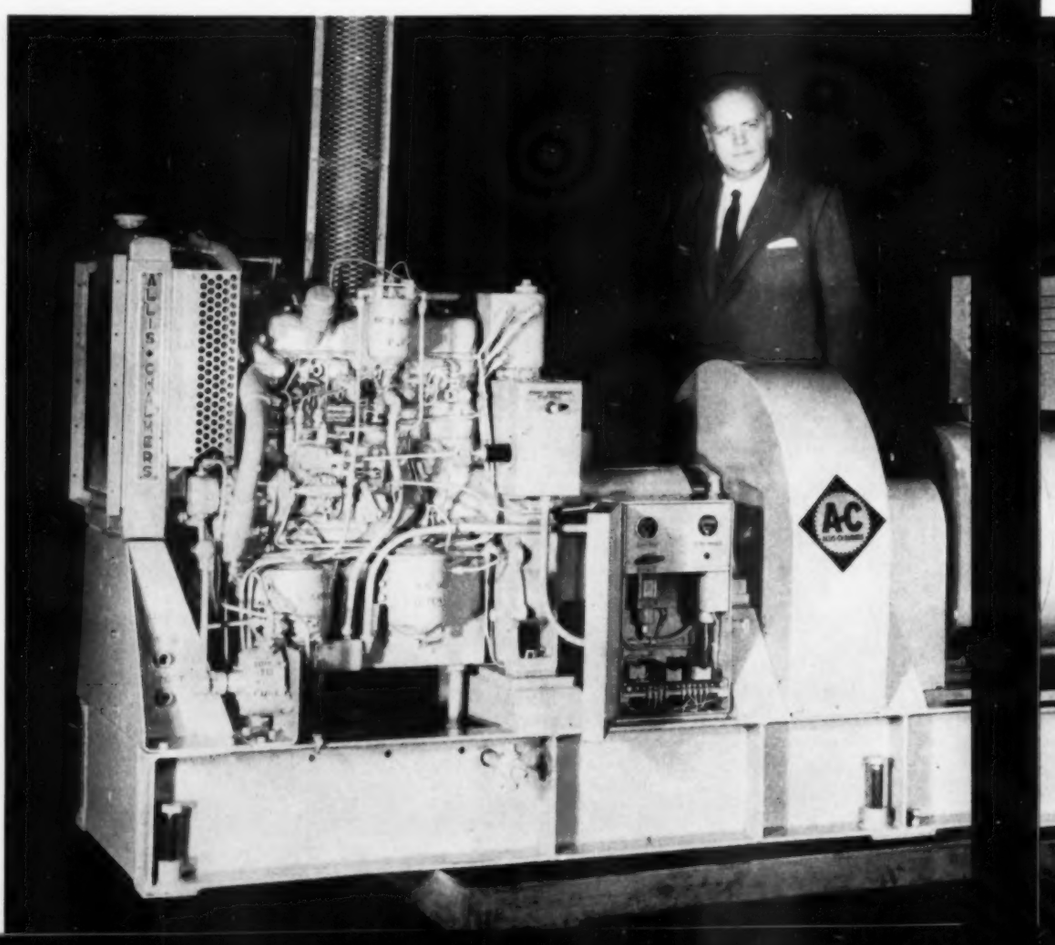
A NEW kind of auxiliary power unit, which jumps in to fill the breach immediately if the regular power source fails, has been introduced by Allis-Chalmers Manufacturing Co. Designed and built entirely from components produced by the Company's engine, electrical and control divisions, the unit was developed to provide reliable, uninterrupted (no-break) continuous power to such devices as electronic control schemes, computers, communication systems, missiles and many other military applications where power outages or voltage fluctuations, however brief, cause failure of the device or system. In many of these installations a momentary interruption of power would cause control circuits to malfunction. Many times it would be necessary to go through a complete cycle of readjustment or start-up procedure which would cause many minutes or even hours of interruption of the service. The consequence of errors caused by garbling of messages in the business world and military information are beyond comprehension.

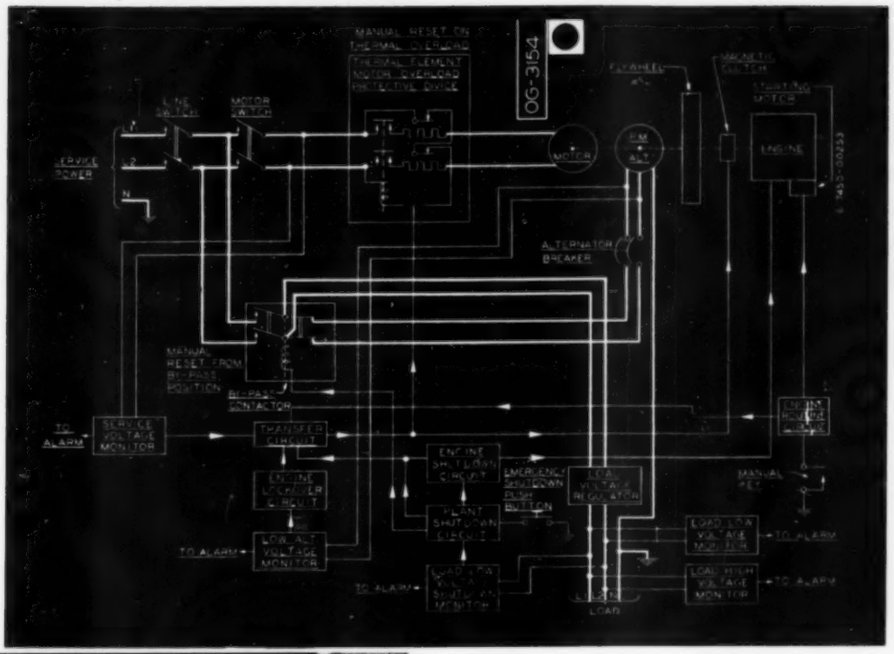
The Allis-Chalmers No-Break unit is unique in the way it maintains continuity of power. Its principal components are a model 4DA-153 diesel rated 38 hp, 1800 rpm; an electric magnetic clutch; flywheel; coupling; 17 hp, 60 cycle, 1800 rpm Synduction motor and 10 kw brushless type alternator. During normal operation the Synduction motor is energized from outside power. The motor drives the generator and large flywheel. If power fails, the electric motor is disconnected from the power line and the diesel engine is started through engagement of the magnetic clutch connecting the engine to the system flywheel. During this period the generator receives its energy from the flywheel. The engine will drive the system flywheel and generator set at a speed that is near the synchronous speed of the utility frequency. This allows the return of high line power and synduction motor drive with a minimum electrical disturbance. When power returns, the automatic controls allow the engine to drive the system for 15 minutes. At the end of this time the clutch is de-energized, the engine stopped and the motor energized from utility power. This system is suitable for continuous operation as a motor generator set and up to 200 hrs. of operation without attention as an engine generator set. The complete unit weighs approximately 5,000 lbs. It is 10 ft. 0 in. long, 2 ft. 8 in. wide and 4 ft. 6 in. high.

Normally a 24 volt electric motor is optional for starting the engine. Hand cranking, however, can be employed and the electric clutch engaged when the system flywheel is rotating at a suitable speed. High speed cranking is accomplished by means of engaging the clutch and rapidly accelerating the engine from the energy received from the flywheel. These three systems allow maximum reliability in initially placing the system in operation and starting the engine during emergency conditions. The engine proper and flywheel bearings incorporate safety controls which are used in conjunction with an automatic control to shut down the unit in the event of high water temperature, low oil pressure, engine overspeed and high flywheel bearing temperature. The Allis-Chalmers 4DA-153 was chosen for the following major reasons: 1. ample reserve of power to allow full rating up to 10,000 ft. altitude; 2. rapid starting; 3. rapid acceleration which permits reasonable sized flywheel; 4. reliability due to power reserve to the extent that one cylinder could be inoperative and the generator set could still deliver full rated load, and 5. rapid acceleration of the system when transferring to emergency engine drive. The engine, flywheel, coupling and other components are mounted on a structural steel sub base, rigidly constructed to withstand the shock caused by operation of the clutch as well as the shocks and strain caused by transportation. A radiator type cooling system is used with the radiator mounted at the forward end of the base. Under normal operating conditions the engine temperature is held below 200° F. with full rated loads on the generator and in ambient temperatures, up to 120° F. and elevations up to 3000 ft.

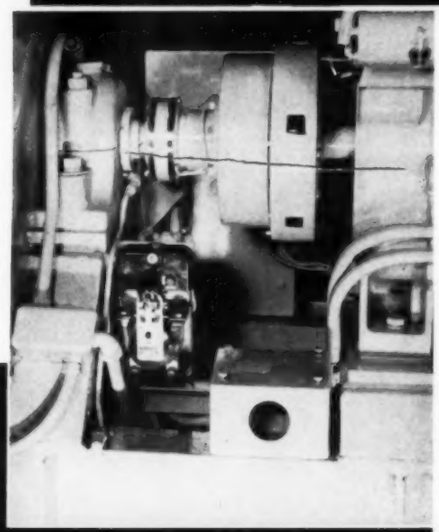
The magnetic clutch, operated from a 24 volt dc source, is of the single disc type and is oversize to withstand the torque and shock loads imposed by this service. The flywheel is statically and dynamically balanced to operate at a perepheral speed of approximately 13,000 fpm. It is mounted

Robert C. Arner, engineer in charge of Allis-Chalmers' diesel generator set program and the "No-Break" unit. Its components from left to right are: model 4DA-153 diesel; electric magnetic clutch; system flywheel; coupling; synduction motor and alternator. The engine control cabinet is shown with the door open.

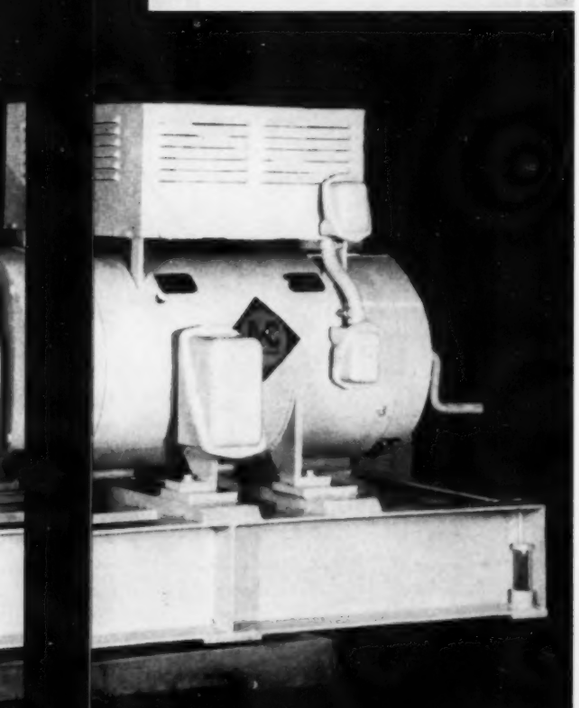




Block diagram of electrical system.



Close-up of the electric magnetic clutch and cranking overload relay (optional) with housing removed.

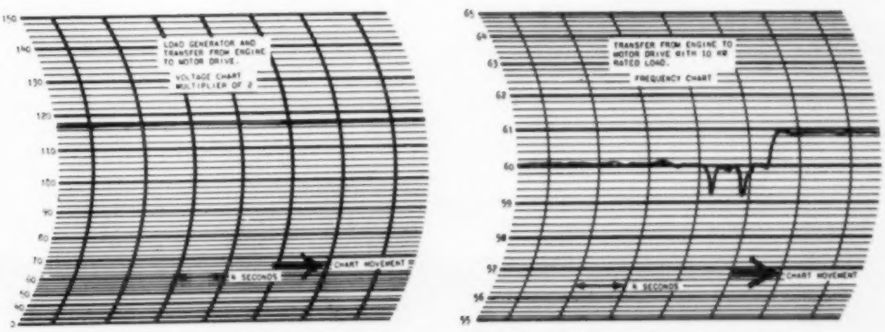


on high speed roller bearings of the pedestal type. This flywheel has sufficient WR² to allow the generator to carry full rated loads as well as engine starting load with a speed change from 1800 rpm to a speed not below 1650 rpm. By the time the generator is reduced to sub-synchronous speed, the clutch would engage and the generator will be accelerated to 1800 rpm (synchronous speed) by the engine. A control panel is conveniently mounted adjacent to the clutch on the outside of the base. Here are grouped the necessary safety control switches and gauges, stop control and terminal blocks. Control panels for separate mounting can also be provided to meet the individual installation requirements.

Various alarm and warning circuits are also available and equipment can be incorporated to signal operating characteristics at the unit or at remote locations. The Synduction motor and alternator, built at Allis-Chalmers' Norwood Works, are built with all brushes and slip rings eliminated. To eliminate any backlash between the alternator and driving motor, the two are mounted on a common shaft. To demonstrate the features and operating characteristics of the No-Break power unit, a number of tests have been conducted on a proto-type unit at the Company's Harvey, Ill. Works, assembly site for all the units. The results of these tests, some of which are illustrated on these pages, show the continuity of power maintained in transferring from motor to engine drive and return. Sale of this new unit will be the responsibility of the Company's Engine & Material Handling Division.

Voltage

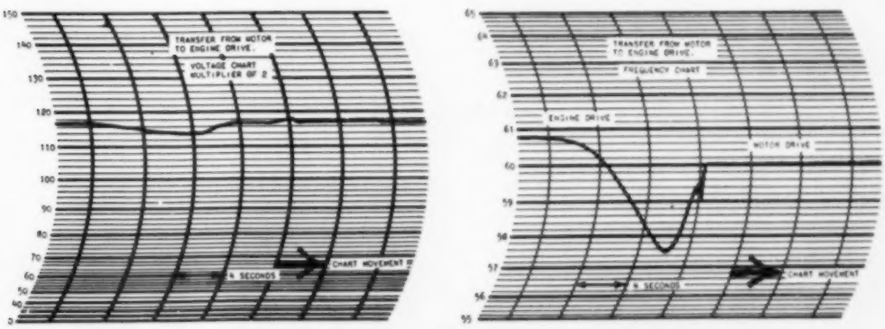
Frequency


LOAD GENERATOR AND TRANSFER FROM ENGINE TO MOTOR DRIVE.
VOLTAGE CHART MULTIPLIER OF 2
CHART MOVEMENT
TRANSFER FROM ENGINE TO MOTOR DRIVE WITH 10 KW RATED LOAD.
FREQUENCY CHART
CHART MOVEMENT

Esterline-Angus meter graphs showing the transfer from engine to motor drive with alternator at full load. Note synduction motor pull into synchronism.

Voltage

Frequency



These graphs show the transfer from motor to engine drive which is accomplished automatically in event normal power fails. Note alternator output frequency dip and recovery under engine power.

BRIGHT FUTURE FOR GAS PIPE LINE INDUSTRY

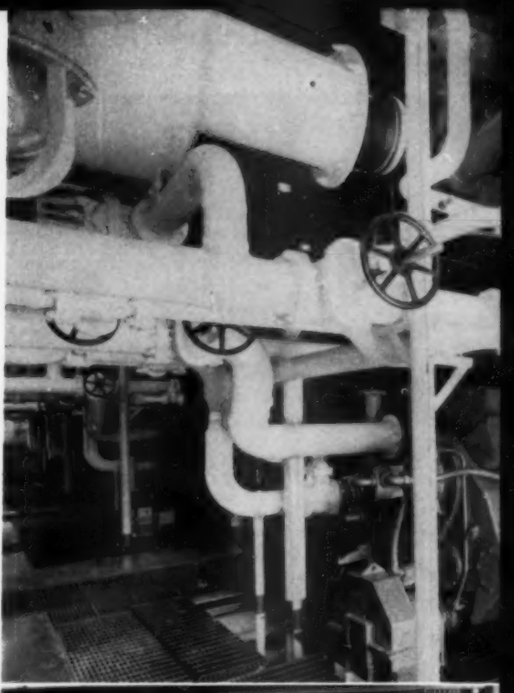
The Demand for Natural Gas Will Continue to Soar As Transmission Companies Move Heavier Cargos of Gas to Market. Industry Will Install About 650,000 HP This Year In Main Line Stations; 1960 Looks Even Better

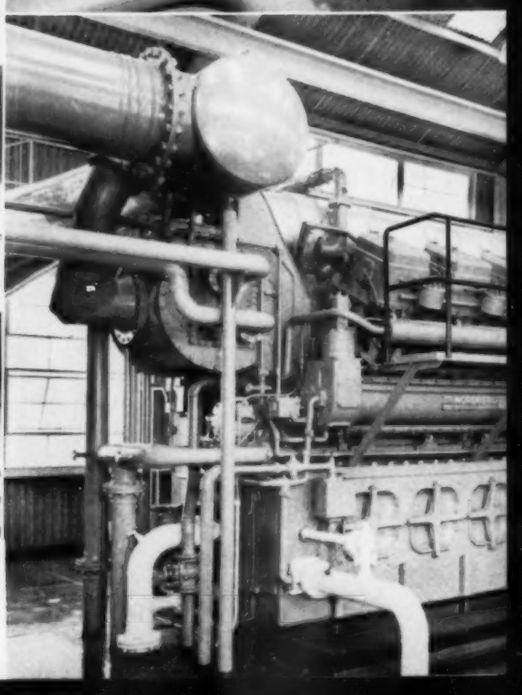
By DONALD M. TAYLOR

ABOUT 20 per cent more compressor horsepower will be installed in natural gas pipeline compressor stations this year than in 1958. If present plans are carried out, pipeline horsepower in the U. S. will increase something like 650,000 in 1959, say a number of key pipeline officials who were queried by DIESEL PROGRESS. Moreover, signs point to an even better year in 1960! Why this optimism? For one thing the Memphis Decision was revoked; but even more important, the nation's industrial growth has turned upward along the lines the industry's leading economists have predicted.

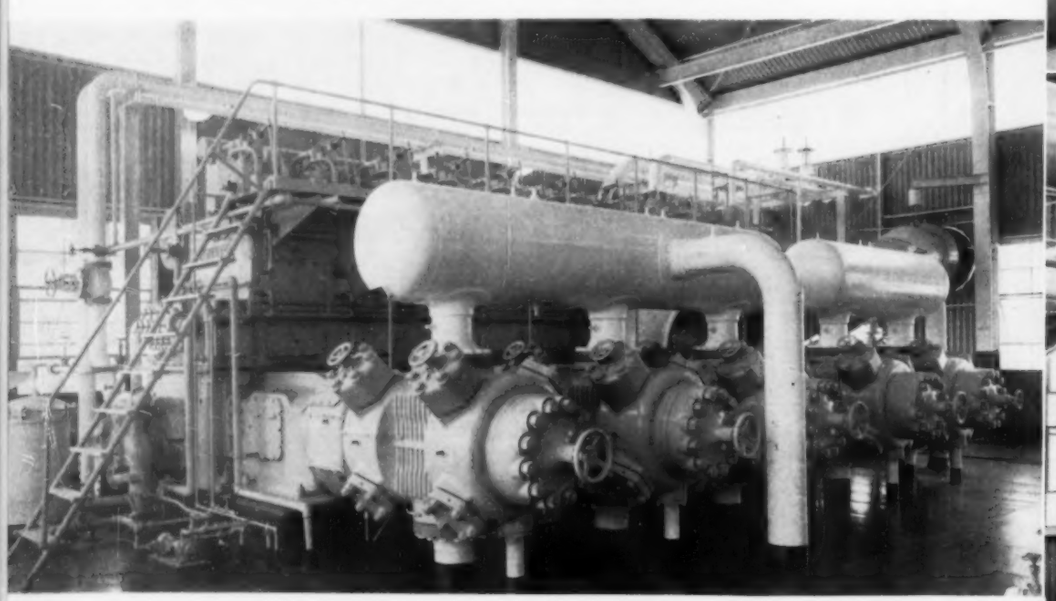
But like most predictions, this one is based on a number of *ifs*. A steel strike about mid-year is not too unlikely, and *if* it materializes, many construction projects will be curtailed, and the need for additional horsepower in many instances will be postponed. Then there is the political threat. *If* the congress now in session should pass all the industry-crippling bills that some of our legislators will propose, pipeline construction will slow considerably. In order for the gas pipeline industry to remain healthy, the drilling and producing branches of the oil industry must stay healthy. To do so, the latter must successfully defend its depletion allowance. Failure to do so will mean fewer exploratory wells and fewer new supplies of gas. Another big *if* facing pipelines has to do with our nation's economy. If it should slide again as it did last year, construction of many new facilities will be delayed.

But before we go into the details of factors that could slow pipeline growth, let's take a look at the positive side of the picture. What is behind the great expansion of pipelines? Why have they continued to grow year after year? As a means of transportation, why aren't pipelines like the railroads which are rarely expanded? The answer is simple. Pipelines afford the cheapest means of transporting gas, and they must be expanded to keep pace with increasing demands. Some of the foremost economists are predicting that natural gas sales will almost double by 1975. What is the basis for such optimism? Consider that the U. S. population, now about 170 million, will increase to 200 million by 1967. This means more gas users. At the same time, our per-capita use of energy is increasing by leaps and bounds. Since World War II labor-saving energy-consuming devices have been moving into the home. One automobile per family is no longer sufficient, and soon our post war crop





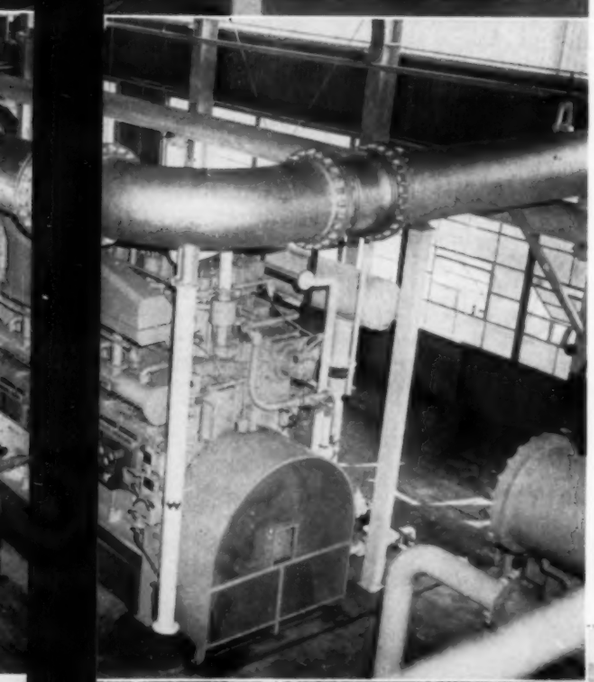
Clark Bros. 3400 hp model TLA-10 supercharged gas engine compressor operating on a major natural gas transmission pipe line in southern U.S.A.



One of five Cooper-Bessemer LSV-16-SG 3500 to 5000 hp engine driven centrifugal compressor units at Gulf Interstate Gas Co's. Alexandria, La. station. At the rear of the engine is the case for the Western Gear 2-step speed increaser for driving the RFB-24 centrifugal compressor.

of babies will be buying their first automobiles. Home ownership is increasing too, requiring more central heating and air-conditioning units.

In this spiraling energy market, gas is doing better than just holding its own. According to the Chase-Manhattan Bank's annual petroleum industry study, oil and gas together supplied 69 per cent of the total U. S. energy in 1957 and will supply about 74.5 per cent in 1967. Because of its low cost and convenience, gas will continue to expand at the expense of coal and at the same time take markets away from oil. Despite the recession, natural gas sales were 3 per cent higher in 1958 than in 1957. According to the American Gas Association, gas companies sold slightly more than 77 billion therms last year or about 7.3 trillion cu. ft.! Few people think of natural gas as having weight, but according to this figure, our pipelines delivered 332,000,000,000 lbs. of the fuel in 1958 or almost ½ million tons per day. Yet this total by no means includes all the gas produced. Left out were the huge quantities of gas that go into petrochemical, carbon-black plants, etc. as well as a portion of the gas used by refineries. Total production in the U. S. was just about twice the amount sold by the gas companies. Little wonder, the natural gas industry is one of the largest customers of engine manufacturers!



Worthington SUTC-10 installed at El Paso Natural Gas Co., Navajo Station, Gallup, N. M. This is a 2500 hp machine used for natural gas transmission service with a suction pressure of 600 lbs. and a discharge pressure of 850 lbs. Note Elliott turbochargers and Manzel lubricators.

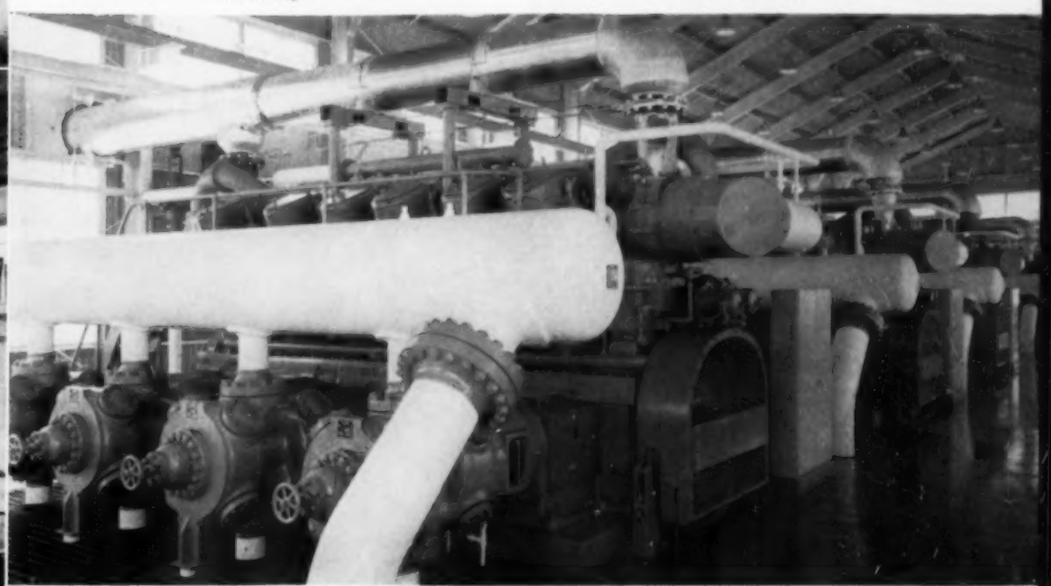
Bottom center—One of four Nordberg V-type, 16 cylinder, spark ignition engines driving a centrifugal gas compressor through a built-in speed-increasing gear in a station of the Transcontinental Gas Pipe Line Corp. Note Young intercooler and DeLaval turbocharger.

Mention natural gas and the average man thinks of home heating. Actually, only 34 per cent of the gas sold last year went for that purpose. Slightly more than half of the gas went for industrial use, and about 700 billion cu. ft. went for commercial use. Compared with the 1957 figures, the industrial sales were off 0.2 per cent while commercial and residential sales were up 9.8 and 9.6 per cent respectively. Note that this sales trend closely paralleled the general economy of the U. S. in 1958. Industrial expansion was at a standstill compared with other years, but consumer buying advanced to its highest level in history.

To a large extent, pipeline expansion follows industrial expansion for the simple reason that industrial sales account for over half the market. Moreover, this market is more-or-less non-seasonal. It would be almost impossible to justify a long transmission line for residential consumers alone. During summer months the line would virtually shut down, and to meet the great demands of cold weather, its capacity would have to be considerably over-sized. The heating market and the industrial market go hand-in-hand; the latter can be curtailed in favor of heating customers when cold weather strikes. So far as revenue was concerned last year, residential sales totaled $2.4 billion while industrial sales—of greater volume—totaled up to only $1.2 billion. Summed up, this means that residential heating is the premium market, yet it will rarely justify the high-cost expansion of a gas system without growth of the industrial market. This in part explains why a number of gas companies post-poned system expansion last year.

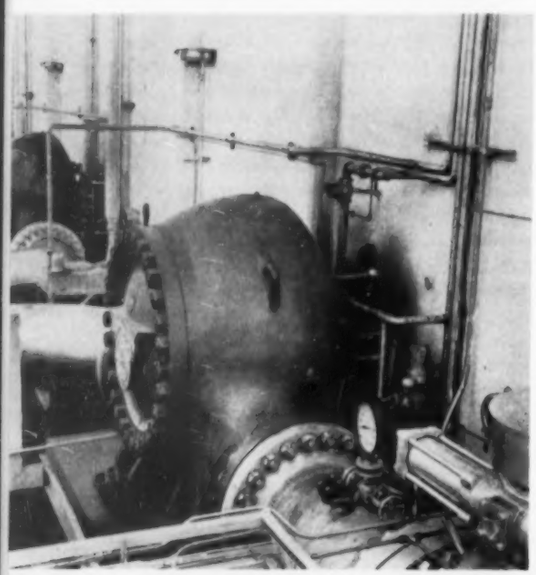
Another cause of lagging construction in 1958 was the Memphis Decision. It kept a number of gas companies in a dither all year, holding that an interstate gas company could not ask the FPC for increased rates without prior approval of its customers. Yet the gas industry is a regulated industry, and its profits are limited to about 6 per cent

Five 2000 hp Ingersoll-Rand KVS gas engine compressors installed in an Indiana station and used for boosting main line pressure.



of its capital investment in any given year. But these earnings are *not* guaranteed, and price increases in gas, taxes etc. must be passed on to the customer—else our interstate gas transmission companies wouldn't survive over a year or so in these inflationary times. When the Supreme Court reversed the ruling, gas companies resumed the long-standing procedure to obtain price hikes. When taxes, field prices etc. advance, the company can once again file for an increase with FPC. The latter suspends the hike for six months, and if it takes no further action, the rate increase goes into effect. Bad as the Memphis Decision was, it should be pointed out that a number of the large pipeline companies were not directly affected. They had provisions for increases drawn up by the customers at the time of the initial contract.

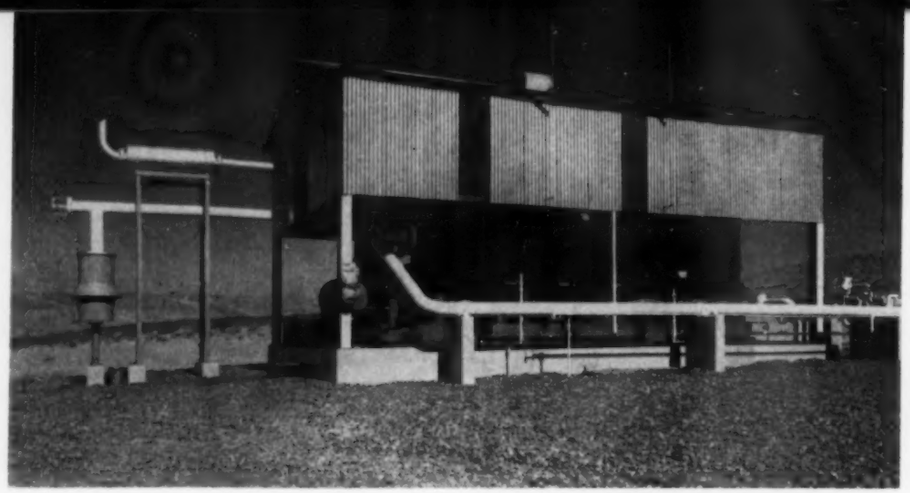
As things are shaping up today, pipeline growth is assured because of the long-range expansion of markets. The American Gas Association is predicting that the gas industry—now valued at $19.9 billion will double by 1969! The AGA says companies will spend about $1.8 billion this year for new construction which is about the same as last



Closeup of a Cooper-Bessemer RFB-24 centrifugal compressor at the Alexandria, La. station of Gulf Interstate Gas Co. This is the first stage unit, one of four shown.

year. However spending in 1960 and 61 will take an upsurge, if the industry is to reach the AGA predicted total of $8.1 billion for the four-year period 1958 to 1962! The predictions of AGA have been highly accurate in the past, so the engine manufacturers can get ready for a boom!

Several new developments may affect the growth of the industry in the next decade. Atomic fuel will be used by a number of power generating plants, but this should prove of minor importance. However the liquification and shipment of natural gas by barge and ship, has definite importance. In liquid form (–250°F) natural gas occupies 1/600th its volume at standard conditions. Thus a ship carrying 33,000 bbl. of liquified gas could deliver the equivalent of 115 million cu. ft. It has been estimated that gas can be purchased in Venezuela



Worthington SLHC-5 gas engine compressor on transmission service for the Pacific Northwest Pipeline Co., Near Grand Junction, Col. This 475 hp machine operates at a suction pressure of 350 to 550 psig; discharge pressure of 700 to 800 psig. Note Cycoil air filters and Maxim exhaust muffler.

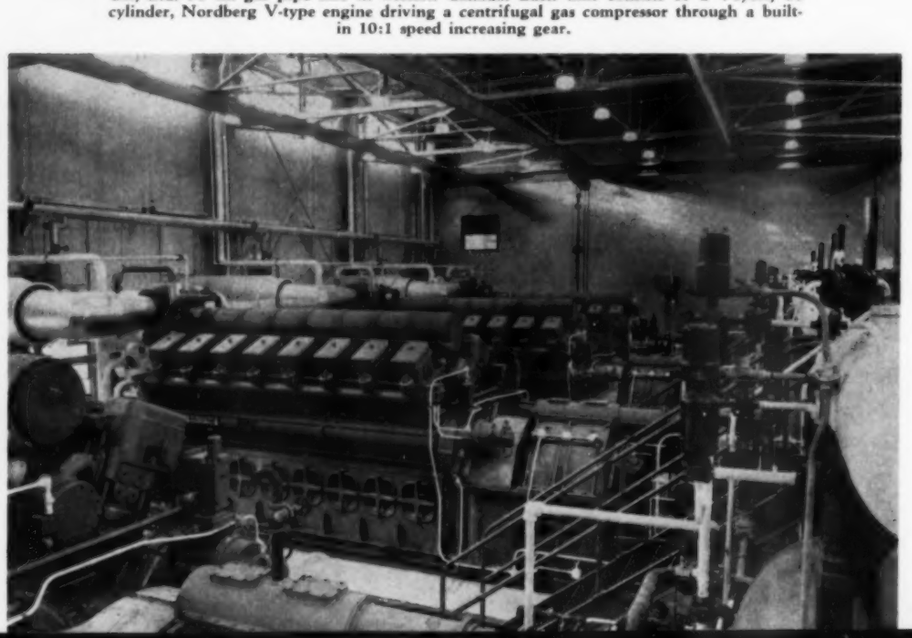
for about 4¢ per 1000 mcf, liquified and transported to New York City area for as little as 21¢. The delivered price of 25¢ per mcf is considerably less than pipeline costs at the same point. This could pose a real threat to pipelines were it not for the fact that foreign governments have a way of squeezing the goose that lays the golden eggs, and it would be unthinkable to have the fuel supply of a large city dependent on the whims of a foreign country. However, a supply of liquid gas could be used for "peak shaving" on cold winter days. And chances are, regular shipments of liquid gas to European nations will commence within the next 12 months. This gas will be used to supplement manufactured gas now being used.

One of the biggest markets for engines in the natural gas industry has not been discussed. As gas fields deplete in pressure, field compressor units must be added to boost the gas up to line pressure. One of the most popular means of accomplishing this is to add skid-mounted packaged units, one-by-one as demanded by falling wellhead pressure. When the gas reservoir has been depleted, the units can be removed and used elsewhere. Virtually all engine manufacturers are now producing the packaged units which are usually complete with compressor, filters, gas scrubbers and coolers. In recent years the horsepower of such units has been increased, and at least one company has been using packaged compressors for one of its main-line stations.

One of the changes we can expect will be the improvement in engine efficiency. Because of the rising cost of gas in the field and the increasing costs of transporting it to market, pipeline companies are no longer regarding the fuel-gas, which stations take from the line, as insignificant. Suppose, for example, a transmission company runs 300,000 hp moving its gas to market. If the stations require 10 cu. ft./hp/hour, this would total 72 million cu. ft. per day. Calculated on an average field price of say, 12¢ per thousand, this would run $8640 per day, or better than $3 million a year. But the same amount of gas would be worth about $10 million at delivery points, and any increase in engine efficiency will be reflected in company earnings. The manufacturers that take efficiencies seriously are likely to profit.

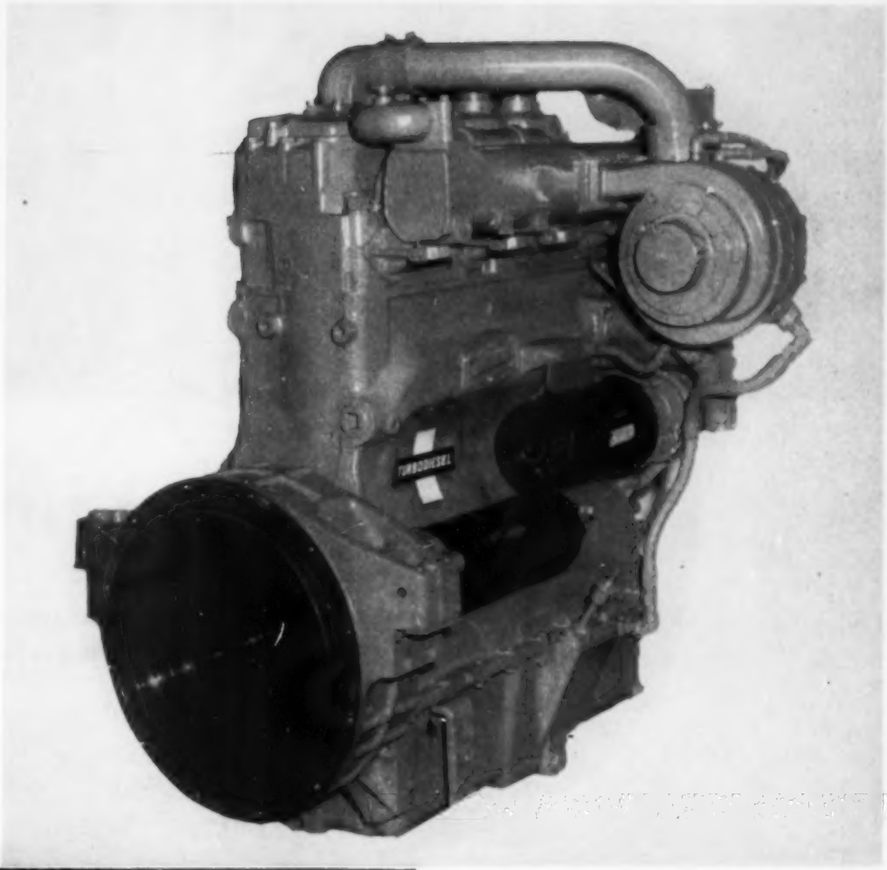
During this year all engine manufacturers will do well and DIESEL PROGRESS' survey is more likely to err on the conservative side rather than the optomistic side. As one company spokesman put it, "Officially we are planning to install about 45,000 horsepower this year. But my guess is that it will more likely be 95,000 hp."

Eleven Nordberg spark ignition gas engines in operation on the Westcoast Transmission Co., Ltd. 30 in. gas pipe line in western Canada. Each unit consists of a 4-cycle, 16 cylinder, Nordberg V-type engine driving a centrifugal gas compressor through a built-in 10:1 speed increasing gear.



FOUR CYLINDER, TURBOCHARGED AUTOMOTIVE DIESEL

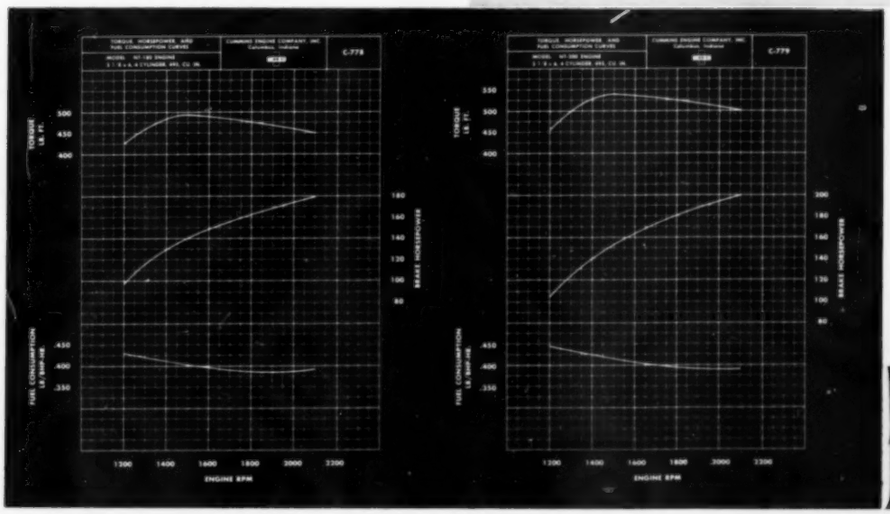
INTRODUCTION of a new truck and tractor engine for on-highway application is announced by Cummins Engine Co. The engine is a four cylinder, turbocharged version of the Company's NH series. It is available in two models, the 180 hp, NT-180 and the 200 hp, NT-200. Principal design feature of the new engine is its light weight which, according to company officials, will be advantageous for those intercity truckers whose payloads are limited by restrictive state legal limits.



Like the NH series, the engine is of the four-cycle type with four cylinders of 5⅛ in. bore and 6 in. stroke. Both models have a 495 cu. in. piston displacement, and compression ratio of 15.5 to 1. Each also weigh 1,935 lbs. with complete equipment for truck installation. This gives the NT-180 a ratio of 10.75 lbs./bhp and the NT-200 a ratio of 9.67 lbs./bhp. The horsepower and torque curves illustrated represent gross power available with all auxiliary equipment except battery charging generator, compressor, fan and optional equipment. Fuel consumption curves represent the fuel when engines are developing maximum power.

An open type combustion chamber is used on the NT series with four valves per cylinder, each 1¾ in. dia., with a stellite insert on the exhaust valve seat. PT fuel injection system is used. The cylinder block takes a wet type liner and the piston, produced from aluminum, takes four rings,

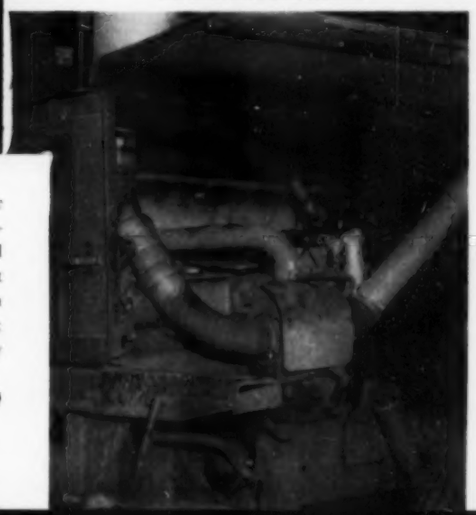
Performance curves of the NT-180, left and the NT-200.



three compression and one oil. Crankshaft has induction hardened journals, the five main bearing journals, 4½ in. dia. and the crankpin journals, 3⅛ in. dia. The camshaft is geared to the crankshaft for positive control of all valve and injector movements and roller type cam followers are used to minimize wear. A gear driven pump, located on the outside of the engine gear case housing, provides force feed lubrication. A centrifugal water pump is V belt driven and is rated 73 gpm at 2100. Thermostat is of the single unit type. The electrical system is 12/24 volt with a 24 volt starting motor; 12 volt, 50 amp. generator; series-parallel switch; voltage regulator and key type starting switch. Overall dimensions of the NT series is: length, 44$\frac{1}{32}$ in.; height, 53$\frac{1}{16}$ in. and width, 31⅛ in.

The first major application of the NT-180 is in a fleet of 74 Kenworth model T522 cab beside engine, single tired tractors recently placed in service by Southern Plaza Express, Inc., Houston, Tex. In this installation, the Cummins engine drives through a Spicer 14 in. 2 plate clutch and Spicer 12-speed Synchro-Master transmission.

Side view of the NT-180 engine is the Kenworth CBE tractor.



The sign erected by the Hialeah Jaycees on Red Road before rebuilding was started.

REBUILDING DEATH ALLEY

A Dangerous Two Lane County Road Is Converted Into a Safe and Beautiful City Highway by Modern Dieselized Machinery

By ED DENNIS

HIALEAH'S long time dream of the rebuilding of Red Road, nicknamed by the local residents *Bloody Red Road*, is coming true. In September of last year, the State Road Department awarded a $793,428.19 contract to the firm of Capeletti Bros., Hialeah, Fla. for converting wreck splattered Red Road into a safe and modern four lane thoroughfare. It will require the digging and moving of approximately 213,207 cu. yd. of rock, muck and other matter by dieseliezd machinery.

The road, originally built in 1925 with rock material from the borrow drainage canal along side, is a county section line road running from the Miami River Canal in the south to the Dade and Broward County line in the north. When it was built, Hialeah was a small town out in the Glades with a few hundred population, but now the city is a bustling municipality of about 75,000 persons with thousands of cars and trucks using this main traffic artery daily. Police officers report that accidents on *Red Road*, dubbed by the local Jaycees as *Death Alley*, have almost become routine entries in the public records.

Started in October 1958, the project—a total of 3.1567 miles running from Okeechobee Road (US 27) north to Gratigney Drive—is scheduled for completion this spring. One of the first jobs was the relocation of several lengths of the old road's borrow canal which claimed an average of one car a week. To straighten the canal out, these sections were obliterated and new sections dug by dieselized draglines, the material thus obtained was used as rock base for the new road. The newly dug borrow canal will have a top lip of 34 ft. and will have a water depth of approximately ten ft. It will also serve as a part of the Central and Southern Florida Flood Control project. Buck Weaver, road superintendent for Capeletti Bros., keeps things moving at a safe but rapid pace. The several dieselized draglines operating along the canal bank dug and stock piled the rock material. The lime rock, after drying, was then loaded onto 12 yd. dump trucks by several Michigan G.M. dieselized front end loaders and Payload tractor shovels with Hercules diesels. Several Euclid 12 yd. scrapers push loaded by an International TD24 tractor were also used in some sections to move these stockpiles and deliver the material directly to the road bed where a fleet of motor graders and rollers leveled the rock continually without interruption in clock like precision. This was perhaps the most interesting operation on the job for this editor to watch.

The new road, when completed, will have on its east side, a 6 ft. sidewalk and a 10 ft. parkway plus the four 12 ft. driving lanes complete with gutters and 18 in. drain sewers on each corner running west to the new canal. Between the new road and the canal there will be a 10 ft. grass strip plus a 10 ft. stabilizer shoulder. The surface pavement will be 2½ in. of a plant mixed asphaltic concrete made up of 1 in. top coating on a 1½ in. binder course (type one); about 141,203 sq. yds. of this material will be used. The base material will be 141,023 sq. yds. of 8½ in. compacted lime rock placed on the stabilized sub base rock, this is compacted to a Florida bearing of at least 75 psi. This type of road construction is used in Florida because of its suitability in this area and for its economy in construction and maintenance. On the west side of the canal the road will be of the *limited frontage type* with pavement for two lanes of traffic. This type of construction will be a far cry from the old death trap where swerving as little as a foot off the pavement would have meant a plunge into the canal waters.

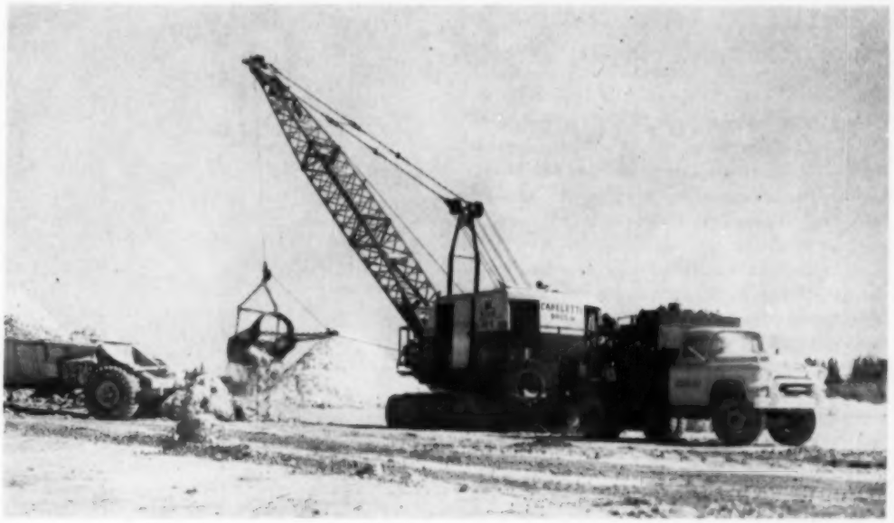
As Hialeah's terrain presents little hydraulic gradient the road construction had to fit into the overall drainage program of the Central & Southern Florida Flood Control Project. This required the building of two bridges over the Little River Canal and eleven concrete steel reinforced culverts ranging in size up to 84 in. in diameter of which 200 ft. were specifically constructed for use under railroad tracks. The drainage phase of the project called for use of a total of 6054 lineal ft. of this

From left, Walter Leaf, equipment maintenance superintendent; Frank Worrell, assistant superintendent of construction; Andrew Capeletti, president of Capeletti Bros. road contractors; Buck Weaver, construction superintendent standing in front of three of the six S12 Euclid hydraulic scrapers with Fuller five speed transmissions. These Euc's were each moving about 1600 cu. yds. of material in a ten hour day.

One of the 12 yd. Euclid scrapers powered with a General Motors 6-71 diesel engine and a Fuller five speed transmission is being push loaded by a TD24 International crawler tractor powered by a 161 hp International diesel engine.

steel reinforced concrete pipe and the construction of 65 inlet or catch basins plus 16603 lineal ft. of gutters. A total of 2288 lineal ft. of 12 and 16 in. prestress concrete pilings and 39921 lbs. of reinforcing steel will be used in the construction of these over the water projects.

From Buck Weaver, construction superintendent, we obtained the following information about the personnel and equipment used on an average day at the construction site: 81 men, five Euclid scrapers, four dozers, three draglines, one truck crane, five water pumps, three graders, two steel wheel rollers, one grid roller, one vibration roller, three water wagons, two tampers, one Gradall, three tractors, one back hoe and a portable welding truck plus a dozen or so trucks. The company owns about 55 pieces of dieselized equipment. Break downs are kept at a minimum as they have several service trucks for greasing and oiling on the road all the time. Lubricating oil and filters are changed every 100 hours of operation, all equipment is checked and greased if needed every day while in the field. Fuel oil filters are checked and changed every three months of operation. And approximately every six months they check valve clearance, remove and test injectors and give the rest of the machine a good going over. Walter Leaf is maintenance superintendent for the construction equipment and he believes in keeping the machinery in tip top shape thereby insuring getting the most out of each piece of equipment. While the record setting pace being set by the Capeletti firm will not help this year's Hialeah Race Track season traffic, it will lower the yearly death rate in seasons to come and help a *growing city* to *grow up*.



A Bucyrus-Erie 1½ yd. dragline powered by a model D342 Caterpillar 210 hp diesel engine. Service truck is indicative of up-to-date equipment used by Capeletti.

A Northwest 2½ yd. dragline powered with a model 21 Murphy diesel digging one of the new sections of the borrow canal.

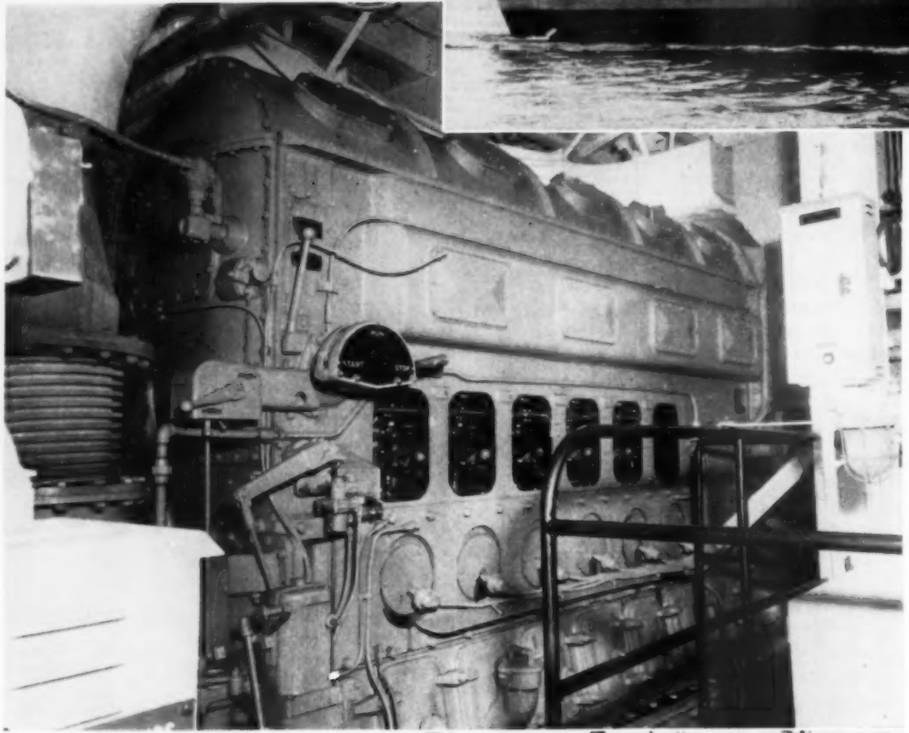
BEACH DISCHARGE LIGHTER UNDERGOING TRIALS

Army Transportation Corps' Experimental Vessel *Lt. Col. John U. D. Page* Uses Two Fairbanks-Morse Opposed-Piston Diesels To Power Vertical Axis Propellers For Both Propulsion and Steering

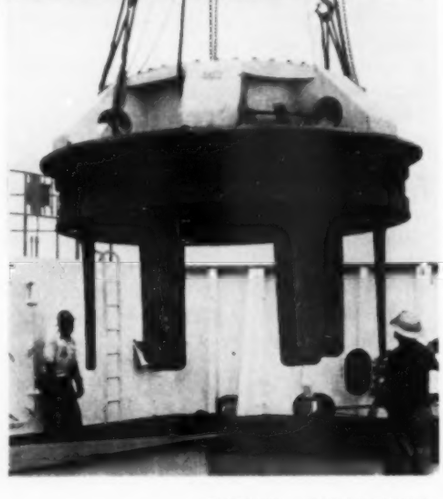
THE Army's revolutionary new beach discharge lighter, the *Lt. Col. John U. D. Page*, is currently undergoing sea trials off the West Coast. This experimental vessel, designed to meet problems of amphibious warfare in the atomic age, employs a pair of Fairbanks-Morse opposed-piston diesels to drive new vertical axis propellers for both propulsion and steering. The trials revealed that this propulsion system made the 338 ft. lighter exceptionally maneuverable, a feature significant for many commercial as well as military applications. The trials are being held at San Diego, Calif., where the vessel was built by the National Steel and Shipbuilding Corp.

The Army Transportation Corps' new beach discharge lighter was designed to "marry up" with ocean-going ships of the roll-on/roll-off type, taking wheeled and tracked vehicles from ships in the stream for discharge at the beach head. Preliminary design was prepared by Bethlehem Steel and Shipbuilding Co., under contract to the Army Transportation Corps. Detailed drawings and construction of the $2,500,000 vessel were accomplished by National Steel and Shipbuilding Corp. in San Diego, under supervision of the Department of the Navy. Extensive engineering and user tests of the *Lt. Col. John U. D. Page* will be conducted on both the Pacific and Atlantic coasts by the Transportation Corps. These tests will include offshore transfer of vehicles from a roll-on/roll-off ship to the beach lighter under varying sea and weather conditions as well as beaching operations.

The new beach lighter has sufficient cruising range and sea keeping qualities to permit delivery overseas under its own power. When trimmed to landing condition, the vessel is so designed that it can operate in shallow waters with a deckload of vehicles or other cargo and effect landings on beaches which have normal gradients. A powerful, hydraulic ram has been installed in the forward portion of the lighter, which permits quick and easy retraction from a beach head to deep water. The vessel with these diverse capabilities is of welded steel construction, 338 ft. in length overall (10 ft. longer than the World War II LST), 65 ft. molded breadth at the main deck, with a light ship weight of 1549 tons and maximum displacement of 4126 tons. Her minimum draft (for landings) is just 4 ft. Maximum draft (for ocean voyages) is 13 ft. 8 in.



One of the two 1200 hp Fairbanks-Morse main engines. Lubricating oil is circulated from main engine sumps thru Briggs filter, Ross cooler and Air Maze duplex strainer. Three Quincy air compressors are installed between the two F-M engines which are governed by Woodward.

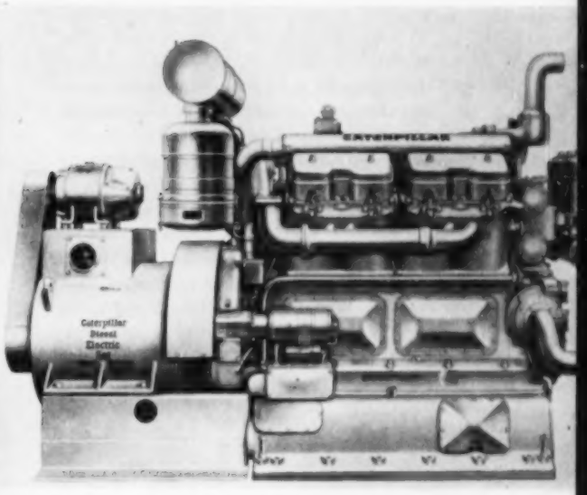


One of the pair of Pacific Car and Foundry vertical axis propellers which combine propulsion and precise direction control in a single system.

Heart of the new lighter and the secret of her unusual maneuverability is the propulsion system. Two Fairbanks-Morse 6-cylinder model 38D8⅛ opposed piston diesels, each rated at 1200 hp at

The Army's revolutionary new beach discharge lighter in trials which revealed its excellent maneuverability, a feature important for commercial as well as military applications. The super-structure, about amidship, is tall and narrow, affording excellent visibility while permitting traffic on both sides. Single funnel with Maxim muffler, serves both main F-M engines.

Three of these Caterpillar D 375 diesels driving 175 kw Electric Machinery generator provide power for ship's service.



850 rpm, drive a pair of Pacific Car and Foundry vertical axis propellers combining propulsion and precise direction control in a single system. Each diesel drives through an American Blower hydraulic coupling, 85 ft. of shaft, and the Vertax propeller's spiral bevel gear train to turn the rotor at 76 rpm. Extending down into the water from the rotor of this controllable pitch propeller are six 4 ft. 6 in. stainless steel vertical blades which oscillate on their axes as the rotor revolves. The angle, or amount of blade oscillation, and the peripheral location of maximum oscillation are continuously adjustable from full speed ahead through neutral to full speed astern. Any direction of propulsive thrust is easily obtained by changing the direction of the slip stream while the propeller runs at a constant speed in an unaltered direction of rotation. The two propellers are outboard turning. The port main engine rotates clockwsie (looking forward) while the starboard engine rotates counter-clockwise. Direct pilot house control of power and direction of thrust is accomplished through a hydraulic system. A pair of pumps supply oil under pressure for propeller lubrication and hydraulic control.

Trials showed dramatically the unusual maneuverability of the vessel. She turned tight circles with ease both at high and low engine speeds. She stopped and reversed direction quickly. She moved athwartship. She made a 90-degree turn without measurable movement. Clearly, there was ample power and complete control of power application. This high degree of maneuverability coupled with maximum starting and stopping power were matters of prime consideration in developing the vessel's design. Installed with the F-M diesels in the engine room and supplying ship's power are three Caterpillar D 375 diesels of the V type with eight cylinders. These engines are direct coupled to Electric Machinery generators rated 175 kw at 1200 rpm. A fourth Cat model D 318 driving a 40 kw EM generator is installed as standby.

The Army Transportation Corps' beach lighter is controlled by this double wheel in the pilot house. Navigational aids include a radio direction finder, fathometer and surface radar, Westinghouse Air Brake engine-propeller control equipment.

The OP diesels and vertical propellers team up with a hydraulic ram to get the lighter off the beach. Both the bow ramp and beach retractor are considered unique. A pair of 20 gpm., 2000 psig., two-stage vane-type pumps operate the hydraulic system for both of these units. The bow ramp, largest constructed for the Transportation Corps, is lowered by gravity using the hydraulic system for rate of descent control. With only one pump, the ramp can be raised in less than 3 minutes. The beach retractor is, in effect, a hydraulic ram. To break the ship from the beach after its unloading operation has taken place, the skipper lowers the ram which exerts a tremendous force pushing the ship off the beach. By continuously changing the thrust angle of the props, the stern is moved from side to side, helping the ship get freed. The total operation takes but a few minutes compared with hours in the second World War when an anchor was dropped off the beach and the crew attempted to pull the craft off. As much as possible of the lighter's deck is reserved for cargo, providing parking and tie-down space for 600 tons of vehicles or 1,000 tons of general cargo. All quarters are below the deck in the mid-section. There is living space for a crew of 37 and also day space for 200 tank and truck drivers. The vessel is fully equipped with the most modern navigational aids including a radio direction finder, loran, fathometer and powerful surface radar.

Officers of the Transportation Corps, who were aboard during the recent sea trials, feel that the *Lt. Col. John U. D. Page* will provide a much needed link in the offshore transfer of vehicles from seagoing roll-on/roll-off ships and subsequent discharge of the cargo at the beach head. With a 4126 ton displacement, a cruising radius of 4,800 miles, 2400 horsepower of Fairbanks-Morse O-P diesels to power her and vertical axis propellers to push and guide her, the Beach Discharge Lighter is one of the most capable "landing craft" yet built.

List of Principal Equipment

Main engines	Fairbanks-Morse
Governors	Woodward
Hydraulic couplings	American Blower
Duplex strainers	Air Maze
Fuel & lube oil filters	Briggs
Air compressors	Quincy
Pyrometers	Alnor
Lube oil centrifuge	Sharples
Lube oil cooler	Ross
Intake air filters	Maxim
Exhaust silencers	Maxim
Auxiliary engines	Caterpillar
Auxiliary generators	Electric Machinery
Switchboard	Lake Shore
Propellers	Pacific Car & Foundry

BULWARK IN DIESEL EDUCATION

By ROBERT DYMENT*

FACTORS such as dependability, economy of operation and low maintenance have contributed to the widespread use of the diesel engine and it is practically impossible to mention an industry that does not rely and benefit from use of these efficient prime movers in one way or another. With dieselization has come the continual need for well-skilled and well-trained young men in all phases of the diesel technology field. The Agricultural and Technical Institute, Alfred, New York, a unit of the State University of New York, is doing a great deal to see that qualified young men receive a well-rounded education in this phase of industry. "Alfred Tech" is truly a bulwark in diesel education.

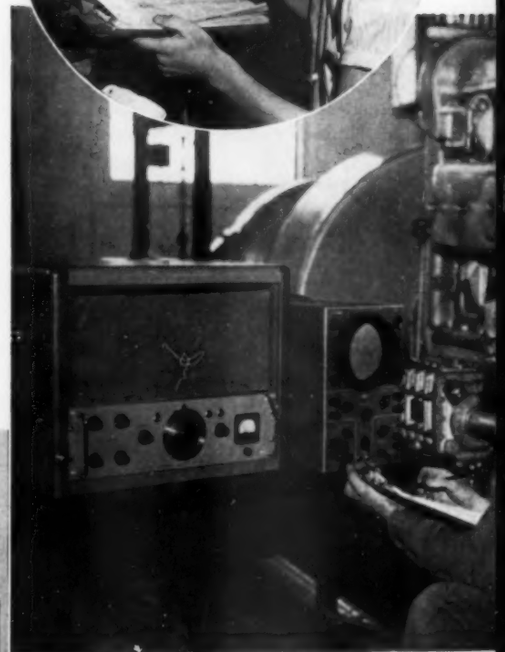
The Alfred curriculum, an engineering technician curriculum, includes the fundamental diesel principles, together with sufficient practical application to provide a broad foundation for the various branches of the field. Along with the diesel lecture and laboratory work the student carries related courses in internal combustion engines, ignition and carburetion, drafting and design. The curriculum is conducted on a junior engineering level. It presents the engineering approach to internal combustion engine design (diesel, gasoline, turbine), and the practical application of the theory in actual laboratory testing. Along with the diesel lecture and laboratory work the student carries related courses in advanced mathematics, fuels and lubricants, strength of materials, machine design, analytical mechanics and electricity.

Instructional facilities include a diesel laboratory for engines, fuel injection laboratory and governor testing laboratory, with a combined floor area of over 6,000 sq. ft. The diesel engine laboratory includes a cross section of type and application represented by over 25 units ranging from 6 to 500 hp. These include Caterpillar, Cummins, General Motors, International Harvester, Mack, Murphy and Witte diesel engines. Many of these units are equipped with generators, complete with electrical test panels and equipment for study of engine electrical principles and problems. The fuel injection laboratory and governor testing laboratory is an enclosed air conditioned area for fuel injection and governor study. Here are found the necessary testing equipment, fuel pump calibration stands and special tools for the study of governors, fuel pumps, unit injections, injection nozzles and other diesel accessories. In addition to the above, the internal combustion engine laboratory con-

*Eastern Editor, *Diesel Progress*

Industrial Science Building at the State University Agricultural and Technical Institute at Alfred, New York.

Observing calibration of Bosch APE pump on a Bosch calibration stand. Spray patterns of various nozzles are studied under stroboscopic light to determine spray development with different pressures and nozzle types.



Student observes a pressure-time diagram on an oscilloscope taken at 1200 rpm on a GM engine. The effect of speed, load and fuel on combustion is studied by using a Kistler SLM pressure transducer and related equipment.

A group of seniors conducting one of the dynamometer tests on a Waukesha engine in the engine characteristics laboratory at Alfred Tech.

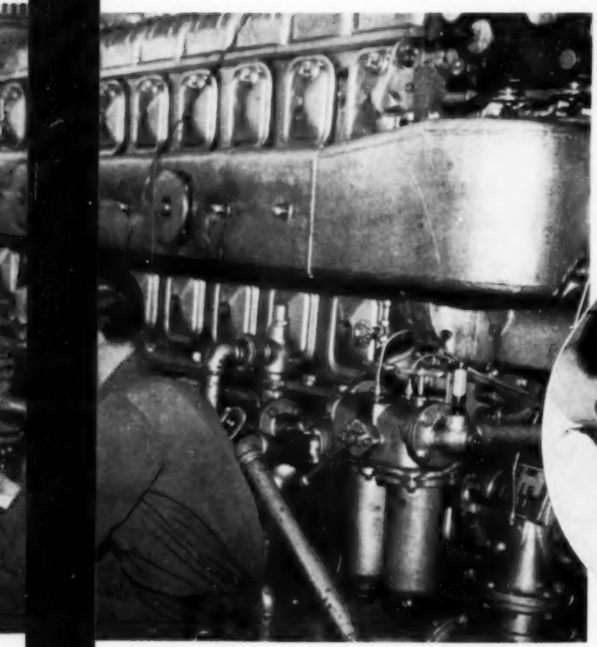
tains some thirty-five engines complete with testing instruments, dynamometers, stroboscopic equipment and test equipment for exhaust gas analysis. A separate area is available for the study and testing of carburetors, fuel pumps, ignition system components (including magnetos and generators), relays and regulators. Some of the diesel engines available in the Engines Laboratory for instruction are: Caterpillar 4600 generator set, 56 hp, 1200 rpm; one Caterpillar 317 S. supercharged engine rated 300 hp, 1800 rpm; two Waukesha generator sets, 35 hp, 120 rpm; one Cummins JBS supercharged, 150 hp, 2500 rpm; one Cummins HMRS supercharged 225 hp, 1800 rpm; one GM 6-71, 225 hp, 2350 rpm; one GM 6-71, 165 hp, 2000 rpm; Allis-Chalmers 6 DT 317 generator set, 76 hp, 1800 rpm; one Mack ENDM 605 S, 205 hp, 2100 rpm; four International Harvester UD 9 generator sets 46 hp, 1050 rpm; one Murphy generator set ME 6, 125 hp, 1200 rpm; four Witte, 6 hp engines and others.

In the engine laboratory first quarter freshmen disassemble and assemble engines. This is done to familiarize the student with the internal construction and cylinder arrangment. Engines are not disassembled with the same end in mind as in a vocational course. Design details are discussed in theory class while this lab is being taught and the lab is held in conjunction with the theory class. Engineering drafting is given for a period of two quarters to familiarize the student with the principles of drawing and the reading of prints. Second quarter students are given a laboratory in fuel injection and equipment is disassembled and spray patterns are studied under stroboscopic lighting to determine the effects of speed, pressure and the like on spray development. Pressure surge is studied with the aid of pressure pickups and oscilloscope. In addition, natural gas fuel systems and ignition systems are studied since the majority of students will be working with concerns directly engaged in the manufacture of such engines. Second quarter students also take a course and a lab in dc electricity.

The students of the diesel curriculum are given two quarters of machine design, in which they study the basic principles of machine design calculations. This gives them a familiarization with the steps necessary in the design of components, the calculation of stresses and in general a knowledge of the job of a design engineer. In addition, they design various types of cams, calculate mathematically and kinematically the piston motion characteristics of velocity, acceleration and displacement. They are also required to calculate net forces on the crankpin resulting from firing pressure and inertia forces of the moving parts. Net crank effort diagrams are plotted from this. The Engine Controls and Systems course is combined with Diesel Lab III and the various types of engine cooling systems, lubrication systems, and fuel storage and transfer systems. They are then given a course on the principles of operation of manual and automatic engine controls.

The Engine Characteristics course deals with the theoretical principles of engine operation and their application to design and testing. The laboratory that parallels this course gives the student actual experience in measuring various factors relative to engine performance, writing reports, analyzing test results and in general acquaints the student with the principles of engineering testing. The student must understand the principles of materials testing and the meaning of such tests to his profession in engine operation. He is therefore given a course of study and paralleling laboratory in strength of materials where such tests are discussed and actually conducted and certain variable introduced to observe the effect on the characteristic being tested. The Fuels and Lubricants study deals with petroleum products, their general construction properties and the effects these properties have on the characteristics of the fuels or oils as used in the engine. To supplement this, a laboratory course is given in which analyses are made of the oils in the engines in the lab, fuel analyses are determined by physical testing, and the importance of the results are discussed. This gives the students an opportunity to observe first hand the various ASTM tests that can be performed and gives them a much better understanding of the tests.

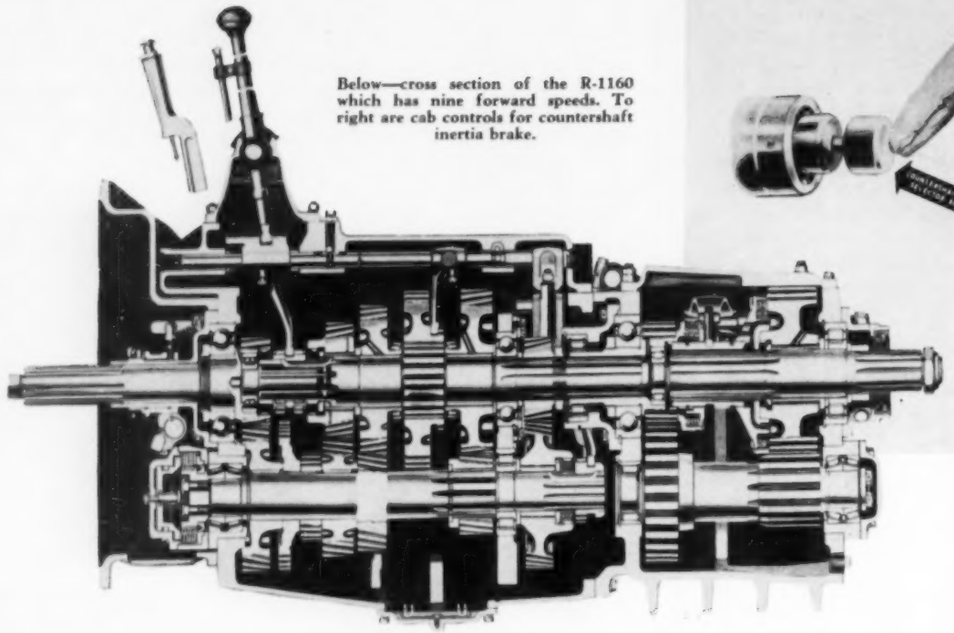
Outside speakers are invited in to discuss various phases of the diesel industry. Each spring, the Diesel Club holds an annual banquet at which time all companies interested in the diesel course and/or its graduates send representatives. A name speaker is also invited. Students successfully completing the Diesel Technology course have been used successfully in such jobs as: Engineering Test Technician, Service Engineer, Applications Engineer, Design Engineer, Accessory Equipment, Project Engineer, Sales and many other diesel fields.



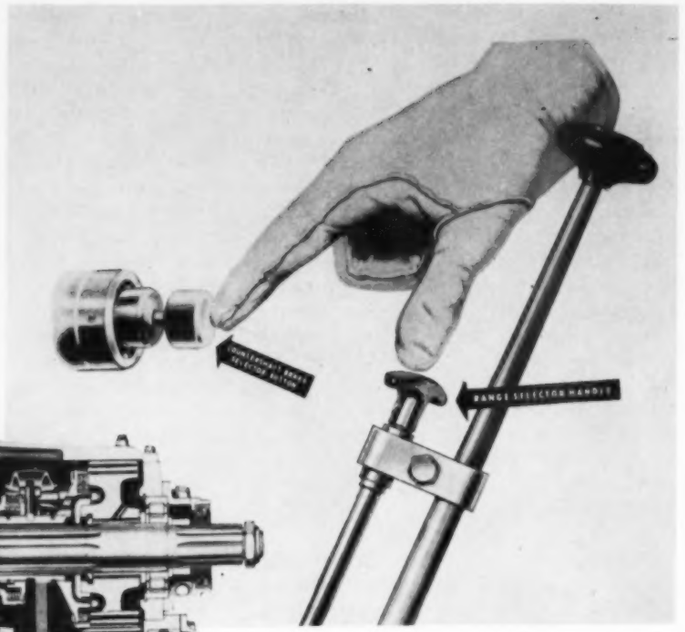
Professor Wilbur W. Smith, Jr., head of the Diesel Department at the Agricultural and Technical Institute at Alfred instructs a class in blower design.

Student uses a viscosimeter in the Fuels and Lubricants Laboratory to determine the per cent dilution of an engine oil sample.

A few of the companies who have employed Alfred Diesel graduates are: Clark Bros. Co., Olean, N.Y.; Worthington Corp., Buffalo, N.Y.; Ingersoll Rand Co., Painted Post, N.Y.; New York Central Railroad, New York, N.Y.; Syracuse Supply Co., Syracuse, N.Y.; A. S. Wikstrom, Inc., Skaneateles, N.Y.; General Motors, Detroit, Mich.; Bendix Scintilla, Sydney, N.Y.; Cummins Engine Co., Columbus, Ohio and many others. The Diesel Technology course is under the supervision of Professor George S. Whitney, who is head of the Tech Industrial Division. Professor Wilbur W. Smith, Jr., is head of the Diesel Department. Full-time Diesel Technology students total 36.



Below—cross section of the R-1160 which has nine forward speeds. To right are cab controls for countershaft inertia brake.



SEMI-AUTOMATIC TRANSMISSION FOR LARGE DIESELS

New Fuller Transmission Has Nine Forward and Two Reverse Ratios: Designed for Off-Highway Equipment Powered With Diesels Up to 1160 cu. in. Displacement

FULLER Manufacturing Co., has announced production of a new heavy-duty semi-automatic transmission designed specifically for big earthmoving and construction equipment. Called the R-1160 RoadRanger transmission, the new model is engineered for tractors and trucks equipped with engines of up to 1160 cu. in. piston displacement. The latest addition to Fuller's transmission line, the R-1160 is designed to handle up to 800 lbs./ft. of engine torque.

Featuring nine forward ratios, the R-1160 is built to give fast work cycles, low fuel consumption, long engine life, reduced road maintenance and lowered operator fatigue. The R-1160 RoadRanger is an outgrowth of the Company's heavy-duty model R-1150. To increase its capacity Fuller engineers widened the faces and coarsened the pitch of both drive and reduction gears in the auxiliary section. Accompanying this modification is an increase in synchronizer capacity and a new auxiliary case of greater section and length to accommodate the larger gears. All yokes in the front section except third and fourth are clamped to the bar. Note cross section illustrated above.

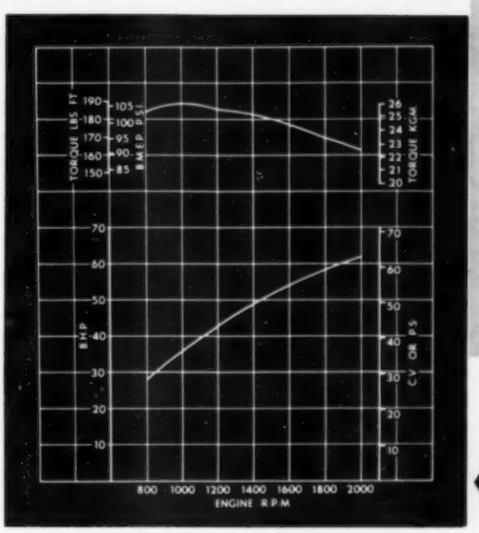
Standard with the new RoadRanger is Fuller's air powered countershaft inertia brake, which provides quick up-shifts without double clutching. To use the countershaft brake, the operator simply presses a button before he makes each up-shift. When the shift is made, the brake automatically slows the countershaft for quick engagement of the next gear set. Thus double clutching is eliminated on up-shifts. Also standard on the R-1160 is the Fuller pressurized filtration system which circulates gear oil through a filter, removing metallic particles and road grit from the lubricant and prolonging the life of the bearings. The R-1160 offers quick, easy shifts because steps between ratios average only 37%. There is no gear splitting. One shift lever controls all nine forward and two reverse speeds; range shifts are pre-selected, automatic and synchronized. With ⅓ less shifting, driver fatigue is reduced. And the choice of nine selective ratios enables engines to work in their peak horsepower and torque range with greater fuel economy.

Gear ratios for the R-1160 RoadRanger are as follows:

GEAR	RATIO	% STEP	
Ninth	.75		)
		33	)
Eighth	1.00		)
		39	) HIGH
Seventh	1.39		) RANGE
		40	)
Sixth	1.94		)
		34	)
Fifth	2.59		)
	RANGE SHIFT	34	
Fourth	3.48		)
		39	)
Third	4.84		) LOW
		40	) RANGE
Second	6.76		)
		34	)
First	9.02		)
Reverse	3.31	High Range	
Reverse	11.53	Low Range	

PERKINS FOUR 270D DIESEL

A NEW four cylinder diesel engine, the Four 270D, for agricultural, marine and industrial applications has been announced by F. Perkins Ltd. This new engine is the first of the direct injection type put into production by the British manufacturer. The agricultural version develops a maximum of 62 bhp, marine engines 58 bhp and industrial units 56.5 bhp, all at 2,000 rpm. The new engine is supplementary to the Perkins L4, which develops approximately the same power. Production of agricultural and industrial engines has already started and marine engines will go into production soon.



62 bhp direct injection Perkins diesel.

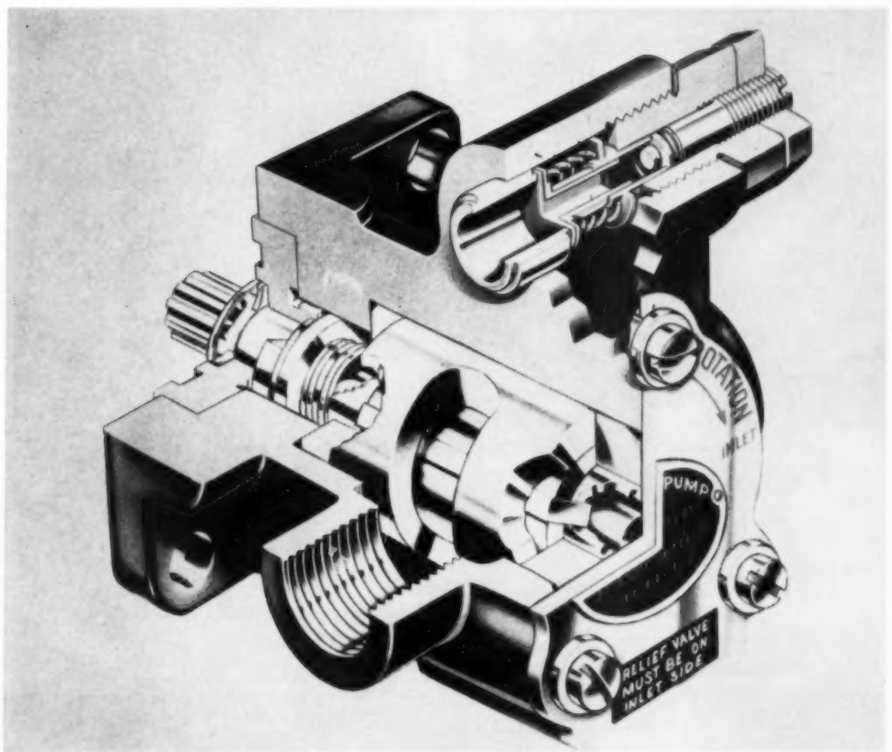
Performance curve of four 270D agricultural engine.

The Four 270D's combustion chamber is formed in the piston crown and fuel is injected directly into the chamber—a toroidal bowl slightly offset from the center line of the piston—through a four-hole injector offset in the cylinder head. Individual sprays are arranged for maximum air utilization, and air swirl in the cylinders is controlled by the inlet passages in the cylinder head without valve or port masking. The passage has been shaped to control the speed and direction of air entering the cylinder throughout the speed range.

The new engine has a 4¼ in. bore, 4¾ in. stroke, and 269.5 cu. in. displacement. Maximum torque is 189 lbs. ft. for agricultural engines and 172 lbs. ft. for industrial units, both reached at 1,000 rpm. Features of the Four 270D include the mechanically-governed, distributor-type fuel pump; a large capacity lift pump, push rod operated from an eccentric on the fuel pump drive hub; cast iron wet liners; and a low level camshaft with the maximum diameter between the cams to give rigidity. The position of the camshaft makes installation of power take-offs particularly easy for agricultural and industrial applications.

The Perkins Four 270D is suitable for many types of industrial equipment including cranes, power packs, compressors, welding sets, tractors and fork lift trucks. A wide range of flywheels, flywheel and clutch housings, and manifolds are available to increase the versatility of this engine. It will also be available in stage-by-stage form up to a complete power pack to suit the requirements of individual customers. Marine engines can be fitted with a mechanically operated reverse gear supplied as a direct drive, or with 2:1 or 3:1 reduction gear. Hydraulic gears may also be used. Keel, heat exchanger or direct cooling will be available.

VERSATILE FUEL INJECTION PUMP



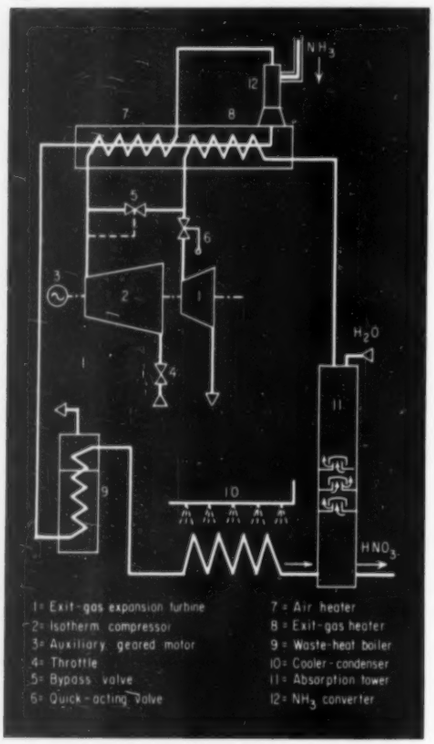
NEWEST in the broad line of rotary-vane, positive displacement fuel pumps manufactured by Titan Pump and Engineering Corp., of Novi, Mich., is the series 5501 pump, designed principally for fuel injection applications in the diesel and automotive fields. The 5501 pump has a fixed pressure type relief valve for maintaining constant pumping pressure to the engine, and is the lowest cost model in the Titan line. Rated capacity is 200 gph, with a discharge pressure range up to 20 psi. Weight of the pump is just 1.8 lbs.

Designed for simple mounting, the series 5501 is equipped with an 11-tooth spline or a ¼ in. sq. drive tang. It can be supplied with either a rotatable or square mounting flange for standardization on various types of engines. The pump consists essentially of a main housing containing a carbon liner with an eccentric bore. A four-vane rotor positioned in this liner is driven by means of a drive shaft coupled with the engine driver. Press fit of the liner and rotor bearings in the central bore of the housing insures correct alignment of the pumping mechanism. The 5501 pump is designed for use on most diesel, truck and bus engines. It can be used as a supply pump where regulated pressure is important, or as a transfer pump.

INDUSTRIAL AND CENTRAL STATION GAS TURBINES*

A Gas Turbine Progress Report by R. Tom Sawyer

INDUSTRIAL as well as Central Station applications of the gas turbine predicted prior to the 1952 Gas Turbine Progress Report have come to fruition. Units now serve peak-load, end-of-transmission-line, base-load, stand-by, feedwater-heating, and combined gas-steam-cycle duties. Over half the units in the U.S.A. burn natural gas, most of the remainder burn a treated Bunker C, some plants wash and centrifuge the oil to reduce the corrosion-causing salts. Gas turbine reliability has been amply proven in service. In one study by H. D. McLean, "Operating experience of General Electric Turbines," ASME Paper No. 58-GTP-18, a group of gas turbines with use factors over 80 per cent were running about 86 per cent of the time, available 98.1 per cent of the time, and had forced outages only 0.7 per cent of the time. Life of such gas-turbine parts as combustion liners, fuel nozzles, 1st-stage turbine nozzles, 2nd-stage turbine nozzles, turbine buckets and turbine wheels depends on operating conditions. Under favorable conditions of natural-gas firing and continuous loading these parts have run over 30,000 hrs. with only minor repairs to 1st-stage nozzles and turbine wheels. Under severe conditions of residual-oil firing and intermittent loading the life of combustion liners is from 3000 to 5000 hrs.; fuel nozzles over 10,000 hrs.; 1st-stage nozzles, 5000 to 10,000 hrs.; 2nd-stage nozzles, turbine buckets, and turbine wheels over 20,000 hrs.



Gas Turbine Developments

Clark Bros. Co. who market the Ruston-Hornsby units in the U. S. have a larger unit of their own with a nominal capacity of 8500 hp that they offer for power generation and industrial applications, Fig. 2. Of the 13 units running or on order, three generate electric power; two are rail-mounted emergency power plants—one 5500 kw unit is for the U. S. Navy and one 6200 kw unit is for the Federal Power Commission of Mexico. As of February, 1958, the General Electric Co. had 160 gas-turbine units installed or on order. Of these 49 generate electric power, 31 of them in electric utility systems. One 16,500 kw simple-cycle single-shaft unit is barge-mounted and serves the Creole Petroleum Corp. on Lake Maracaibo, Venezuela. General Electric is supplying four units for one of the world's largest gas-turbine stations on Vancouver Island, Canada, for the British Columbia Power Commission. The 76 mw station will have two 20 mw simple-cycle single-shaft units and two 18 mw regenerative-cycle single-shaft units. The units will burn treated Bunker-C oil. This plant is expected to be base loaded during the first two years and then work as a peak-load plant with a yearly plant factor of about 25 per cent. The first combined gas-turbine steam-turbine unit (built by GE) went into service on the system of the Crisp County Commission in Georgia in 1958. A 5 mw simple-cycle single-shaft gas turbine, burning natural gas, exhausts into a steam boiler generating

This is an abstract from ASME Paper No. 58A46L by B. G. A. Skrotzki, titled 1958 Gas Turbine Progress Report—Industrial & Central Stations.

Figure 1—Nitric-acid-plant cycle gas-expansion turbine 1 supply part of shaft work needed to drive intercooled compressor 2, auxiliary motor 3 supplies remainder of power input needed by compressor.

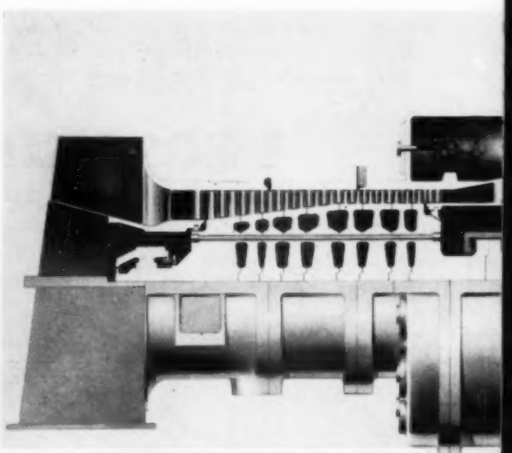
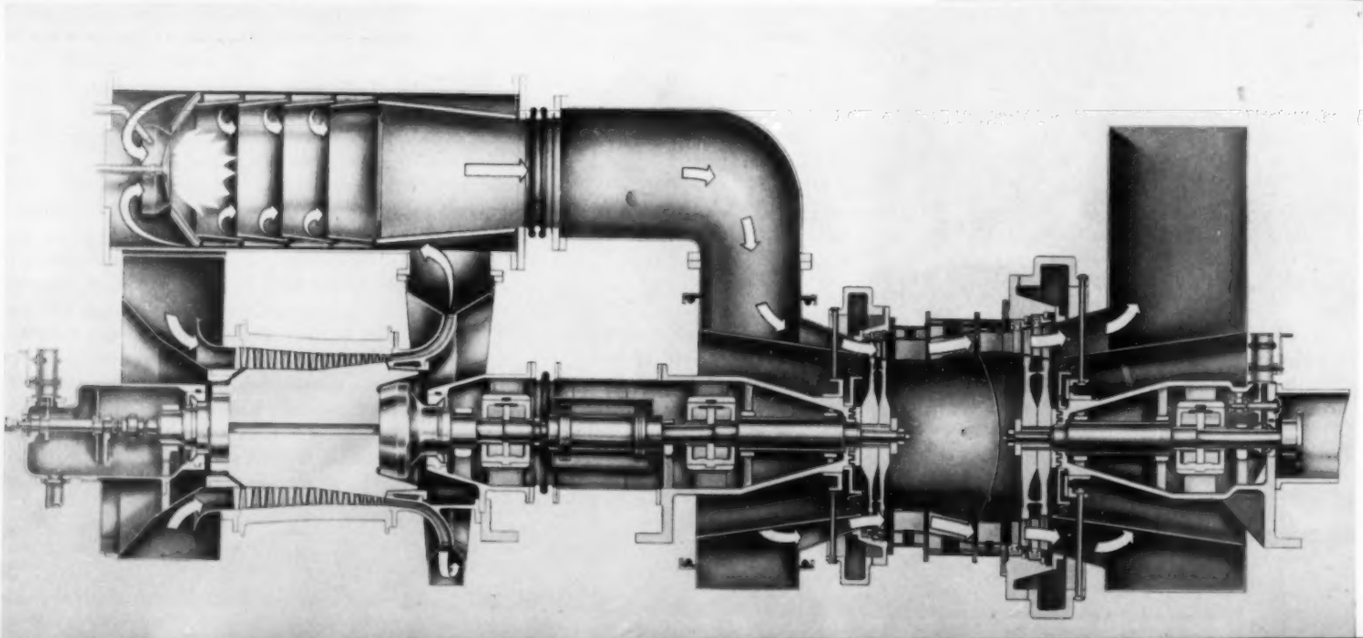


Figure 2—Clark Brothers 8500 hp gas turbine features axial-flow compressor feeding single combustor 2-stage h-p turbine driving compressor and 2-stage 1-p turbine driving the load.



600 psig 825°F. steam for a 12.5 mw steam turbine. Pulverized coal fires the boiler which can develop full power output for the steam turbine when the gas turbine is not running.

Of some 75 units supplied by Westinghouse Electric Corp., 19 generate electric power, as of late 1957. Five of these serve electric utility systems, one is a mobile rail-mounted 5 mw unit and the others serve industrial plants. Studies of the 4700 kw Westinghouse unit installed in Fort Stockton, Tex., of the West Texas Utilities System showed an installed cost of $185 per kw including switchgear yard, transformer, one mile of gas line, and grading. A steam-turbine plant would cost more than $200 per kw. When burning natural gas costing less than 25¢ per million Btu, the gas turbine appears to be economically superior to a steam-turbine plant. In the first five years of operation of this unit forced-outage time totaled to only 73.6 hrs.

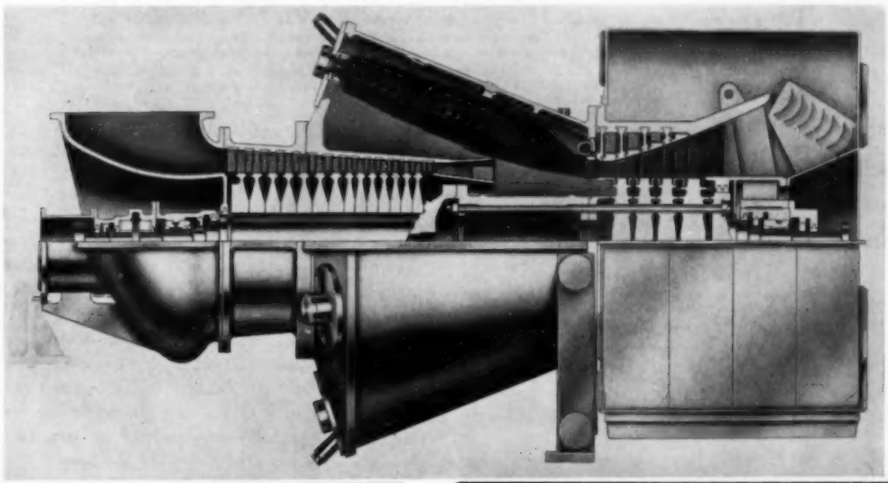


Figure 4—Westinghouse Electric Corp. 3000 hp gas-turbine plant has 4-stage turbine driving axial-flow compressor, uses multiple reverse-flow combustors.

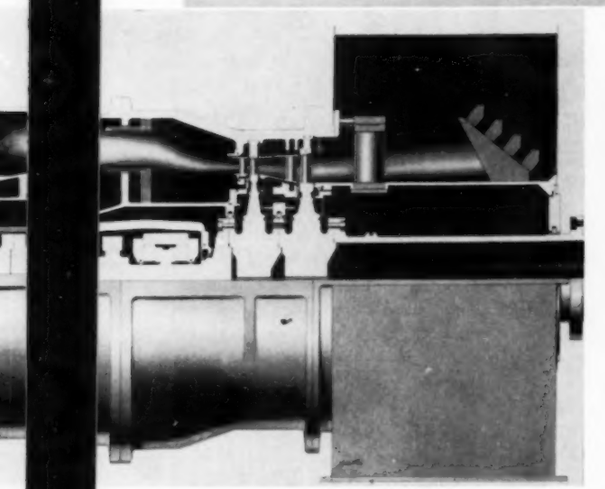


Figure 3—General Electric Co. 21,800 kw gas-turbine plant has single shaft through which 2-stage turbine drives axial-flow compressor, features multiple reverse-flow combustors in parallel.

While most of the original Houdry process units have been retired, other methods of oil cracking still use high-pressure air for catalyst regeneration. About 12 units are now in this service; the circuits are similar to the old Houdry process. These generally produce an excess of shaft power used for electric generation. Variations in using gas turbines appear in processes for making nitric acid and butadiene. Some 64 units will work in refinery, chemical, and petrochemical plants. Brown Boveri has been very active in the nitric-acid-plant applications as described by Z. Stanley Stys in "Gas Turbines for the Chemical Industry," ASME Paper No. 57-GTP-9. Fig. 1 shows the layout of a process cycle built by the Chemical and Industrial Corporation of Cincinnati, Ohio for the Mississippi Chemical Corporation at Yazoo City, Miss. An 8-stage expander (gas-turbine) drives a 9-stage centrifugal, intercooled isotherm compressor that delivers 18,000 scfm of air at 120 psig. The unique isotherm compressor has seven stages of intercooling. Intercooling reduces the shaft-power demand of the compressor. In Fig 1 the compressed air rises to 550°F. in the preheater before mixing with vaporized ammonia over a platinum-gauze catalyst. The columns and towers separate the nitric oxide and nitrogen, and the nitrogen passes through the expander or gas turbine, at about 75 psig after being heated to about 900°F., to develop shaft power for driving the compressor. In this cycle, the turbine cannot develop enough power to drive the compressor so an auxiliary motor must make up the deficiency. In older plants using reciprocating compressors, an input of about 350 kwhr per ton of acid produced was needed. The gas-turbine cycle of Fig. 1 needs an input of only 155 kwhr per ton and this can be brought down to 126 kwhr per ton. The auxiliary motor could be eliminated by using a larger compressor and paralleling a combustor with the bypass valve, number 5 in the illustration, so the turbine could develop all the power needed by the compressor.

Blast-furnace compressors driven by gas turbines have given good service. About 24 units now work or will soon be employed, producing pressurized air for blast furnaces or converters exclusively, or producing enough shaft power to also drive an electric generator. Flexibility also marks the gas turbine in this application which allows variation in over-all arrangements. These units burn blast-furnace gas with a heating value of about 80 to 100 Btu per cu. ft. They also use a stand-by fuel, usually distillate oil. Fig. 5 shows a 125,000 cfm unit being installed by Westinghouse Electric Corp. for the U. S. Steel Corp. The 1350°F. gas turbine drives two axial-flow compressors. One compressor pressurizes blast-furnace gas from 8 in. water up to 52 psia and the other raises air from atmospheric to 48.5 psia. Air from the main compressor is divided, with 38 per cent to the cold-blast main for the furnaces and the balance going to the regenerator for heating from 360 to 840°F. Turbine exhaust through the regenerator cools from 950 to 540°F. Those blast furnace units that have been running for some time are all outside of the U. S. and have given good service.

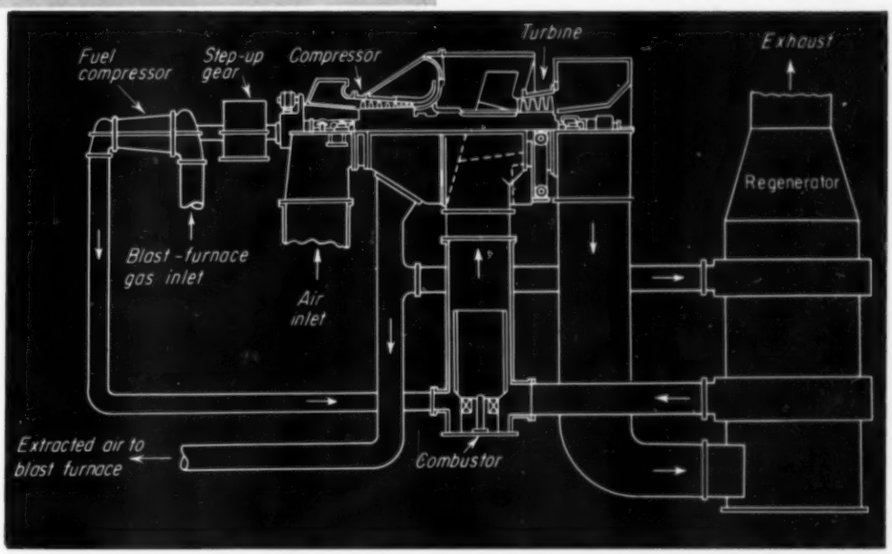


Figure 5—Westinghouse single-shaft gas turbine uses common axial-flow compressor for turbine plant and for supplying 125,000-cfm air to blast furnace.

WHAT'S GOING ON IN ENGLAND

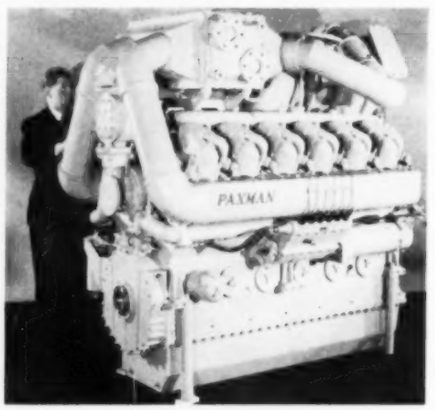
CONDUCTED BY **BERNARD W. LANSDOWNE**

Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as a former editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C. Ltd., Southall, following which he served some five years with that company's sales engineering department. He is now manager-for-the-United Kingdom of a group of business and technical publications.

Paxman Introduces Two New Diesels

The introduction of a completely new engine design, as opposed to the adding of improved or modified versions to an existing range, is an event all too rare these days among manufacturers on both sides of the Atlantic. It was quite unique in England, therefore, when Davey Paxman at Colchester, who are members of the Ruston group of Companies, announced simultaneously two completely new engine designs. One of these, among the largest air-cooled diesel engines commercially available anywhere in the world, breaks completely new ground for Paxman although, of course, their associates, Ruston & Hornsby of Lincoln, already have a familiar range of small air-cooled units. Paxman have called their new air-cooled design the *Vega* series, and the range comprises 8 cylinder and 12 cylinder vee form engines together with a 6 cylinder inline version. The power range covered by the new engines is from 200 to 466 bhp. at speeds up to 2,100 rpm. With the introduction of the *Vega* series, the joint Ruston-Paxman air-cooled engine range now extends from 6 bhp. up to 466 bhp. The output per cylinder of the new engine is 38 bhp., the cylinder dimensions being 6 in. bore by 6.6 in. stroke.

In general design, all of the *Vega* engines are similar, and a very high degree of interchangeability of parts has been achieved. Of particular interest is the use of a side-by-side arrangement for the connecting rods with the cylinder barrels of each bank staggered accordingly. This is a departure from Paxman's more usual blade and fork construction on their vee engine design, but in this case with the cylinder centers being controlled by the cooling fin diameters on the outside of the cylinders, no useful space saving would have been achieved by the adoption of the more complicated blade and fork construction. Cooling for the engine is provided by an axial flow cooling fan driven from the free end of the crankshaft by a triplex chain. The cooling air is ducted to each cylinder bank and the normal arrangement is for the air to be drawn into the fan and delivered past the cylinders to be expelled from the outside of each cylinder bank. For certain installations, however, it is possible to reverse the flow, drawing it from the outside of each bank and expelling it through the fan, whence it can be ducted appropriately to atmosphere. A temperature controlled hydraulic coupling can be fitted in the fan hub to permit variable speed operation of the fan.



The V-12 cyl. turbocharged and intercooled *Ventura* diesel.

A C.A.V. fuel pump is fitted as standard, and either mechanical or hydraulic governing is available as required. The two lubricating oil pumps supply respectively, high pressure oil to the bearings and low pressure oil for circulation through the oil cooler. The cooler is situated in the air stream at the end of one cylinder bank. The design of the cylinder head and barrel followed much development work to achieve the most satisfactory cooling of the cylinder. In this work thermo-responsive paints were used, in addition to the more conventional thermo-couples.

The second new Paxman design, known as the *Ventura*, does not represent such a startling change from the Paxman convention as the *Vega* in that it follows closely along the lines of Paxman's familiar RPH and YHX series of engines which are already in widespread use throughout the world. The *Ventura* has been developed to supplement the existing Paxman ranges, and by careful design a greatly reduced specific weight has been achieved. The *Ventura* has bore and stroke dimensions of 7¾ in. and 8½ in. respectively and the normal running speed is 1500 rpm. The range comprises 12 and 16 cylinder units and has, since its inception, been designed for turbocharged operation. As an alternative, turbo charging and inter-cooling can be provided to give a maximum output in the case of the 16 cylinder engine for traction purposes of 1,870 bhp. A 60° vee-type arrangement is employed and, as previously mentioned, the design follows in many respects traditional Paxman lines. General departures in layout are the mounting of the fuel pumps on the outside of each cylinder bank and the use of a single turbocharger mounted above the engine.

The main housing, which combines the crankcase and cylinder blocks, is fabricated from steel plate and precision steel castings. This general type of construction has long been used by Paxmans and this particular design is a refined and lightweight development of that technique. The crankshaft is fully counterbalanced and has hardened hollow pins and journals. Thin shell, copper-lead large-end and main bearings are used, special attention being paid to location and retention and the connecting rods are of fork and blade type. The pistons are in light alloy with hardened cast-iron ring inserts and are oil cooled by a spray from the top of the connecting rod. The liners are of forged steel, chromium-plated internally and externally, and treated in the bore for oil retention. The cylinder heads are in aluminum alloy, carrying four valves with aluminum-bronze screwed-in valve seat inserts. The injector is centrally disposed and each pair of valves is operated by a push rod through a single rocker and aluminum bridge-piece from a centrally mounted camshaft. Roller tappets are carried in separate castings.

The drive to the camshaft, fuel pump, governor, oil and water pumps, is by gear train from the drive-end of the crankshaft. Two lubricating oil pumps are fitted, one for the pressure system to the bearings and the other for circulating oil from the sump through the external cooler. A single water pump is used and a thermostatic bypass valve is fitted as an integral part of the water system. Monobloc C.A.V. fuel-injection pumps are provided for each cylinder bank and are driven by cardan shafts from the main gear train at the drive-end of the engine, overspeed trips being incorporated as standard.

HELEN S OF FLORIDA

By ED DENNIS

IN an installation that was the first of its kind in Florida, another party fishing boat has switched from gasoline to diesel engines. When Capt. Dan Garnsey repowered the *Helen S* with a pair of Volvo MD47 Penta diesel engines, his future big dollar savings were realized in the first 48 hrs. of diesel operation.

The *Helen S*, recognized as one of the finest party fishing vessels along the Gold Coast, operates out of the Hillsboro Inlet at Pompano Beach. Built to the owner-skipper's specifications for drift fishing, the craft specializes in fishing the waters of the blue gulf stream which runs along the South Florida coastline. Grouper, snapper, king, plus the beautiful and crafty dolphin are but a few of the many species caught in these waters.

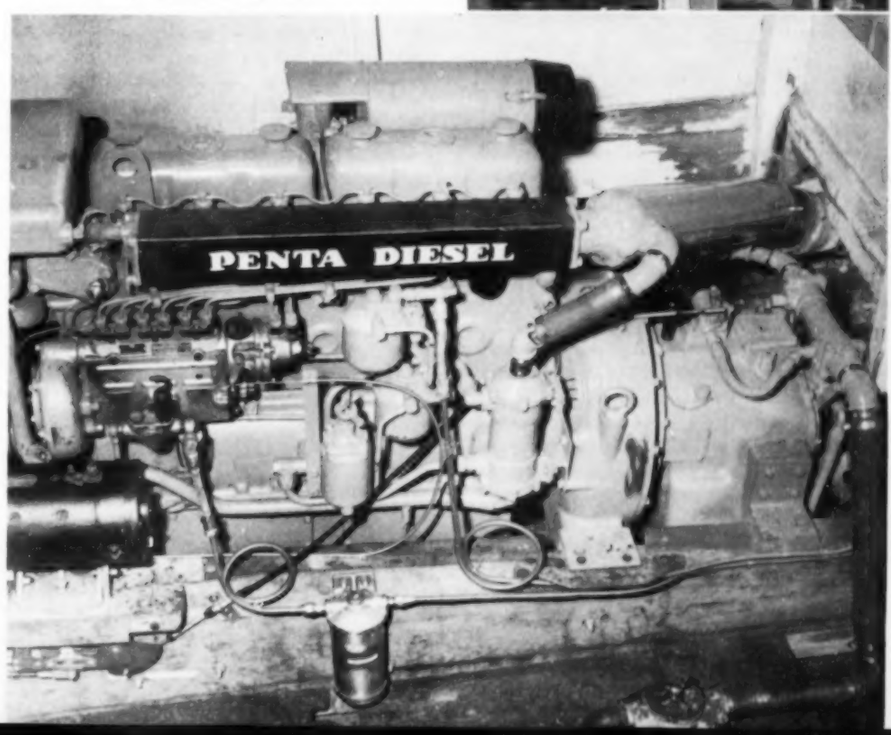
With 24 years of experience in the fishing industry and having owned about a dozen vessels, Capt. Garnsey, in 1953, had the *Helen S* designed by Walter Simmons of Wenonah, N. J. and commissioned the firm of Sable and Ruark of Deltaville, Va., to build it. Craftsmanship was not sacrificed in its construction. Planked with 2 in. by 8 in. select pine, it has a 12x16 in. keel. The craft, measuring 60 ft. by 16 ft. by 30 in., has comfortable accommodations for 35 passengers. Captain Dan, as he is fondly called, explained his reasons for his switch to diesel engines was to improve the performance and maneuverability of the vessel through the rugged Hillsboro Inlet, to give it greater safety at sea and to cut operating costs.

Originally powered with a pair of 145 hp gasoline engines, the craft was repowered with a pair of MD 47 Volvo Penta diesel engines rated 82 bhp at 2500 rpm furnished by J. Frank Knorr, Inc. of Miami. The new 6 cylinder diesels working through 3:1 Capitol hydraulic reverse and reduction gears drives the 1¾ in. monel shaft with 26x25 three bladed Michigan propellers to give the craft a speed of 14 mph at 2200 rpm. While the old gasoline engines had a greater horse power rating, the new diesel installation gives the vessel an increase of approximately 1 mph. The most important part of this installation is the fuel consumption. Capt. Garnsey reported the amazingly low fuel oil consumption of 88 gals. for the first 48 hrs. of operation for both engines. His fuel oil bill for the first week was $18.00 as compared with $97.00 for the old gasoline engines.

The *Helen S* near the Hillsboro Inlet docks.

Standard equipment on the new Penta diesel engines are Robert Bosch starters and generators and a C. A. V. fuel injection system plus the secondary fuel oil filter. The primary filter is a Fulflo fuel oil filter. Two interconnected 90 gal. monel fuel tanks give the vessel good operational range. Another economy factor attached to this new installation is the reduced rates for insurance. Rates for diesel driven craft are substantially lower than gasoline powered craft. This new installation along with its seagoing ability makes the *Helen S* one of the finest fishing boats along the Gold Coast.

Capt. Dan Garnsey of the *Helen S* with J. Keith Kelly, sales manager of J. Frank Knorr, Inc.



The starboard Penta diesel engine. This 6 cyl. diesel has a marine output of 82 bhp at 2500 rpm. Also shown is the Capitol hydraulic 3:1 r&r gears, C. A. V. fuel injection system and a Commercial fuel oil filter.

DIESEL SERVICE PROGRESS

A COMMENTARY BY **GEORGE R. MACKEY**

George R. Mackey was long associated with Detroit Diesel Engine Division of General Motors Corp., and had prior experience as a mechanic in Europe and the U.S.A., which enabled him to become well acquainted in the diesel and service fields and to obtain a broad scope of the service industry from the customer's and management's viewpoint. Further training at Carnegie Tech and in the Army Ordnance during World War II provided the necessary requirements in planning service programs. Progressive advancement in diesel service areas in General Motors and with Detroit Diesel led to his position as Supervisor of Service Promotion. Upon termination of employment with General Motors in 1952, he joined Clayton Manufacturing Company, and his present position with this organization is Sales Manager of the Dynamometer Division.

Compensation and Incentives in a Service Department

IT is accepted that suitable compensation must be paid to all employees if they are expected to perform a satisfactory job and remain with an organization. This compensation—whether fixed by organized labor or accepted as a justifiable wage for a job classification, is regarded as a financial incentive and is required if the maximum end results are to be expected. There are other incentives, classified as non-financial, that are also important for the maximum productivity and smooth operation of a service business. While the definition of an incentive may vary somewhat, it can generally be defined as "the hope of something that spurs an individual onward, or a reward for effort." The non-financial incentives are those things an employer may do for his employees over and above the wages paid. Some of the popular non-financial incentives are a pat on the back for extra effort, a word of appreciation for a job well done, flowers or a basket of fruit for an employee or members of his family during illness, dinners, family picnics, and various other methods that will make an employee feel that he is a member of the total organization.

A number of years ago, the owner of a distributorship solved a complex personnel problem in a manner which proved beneficial beyond all expectations; so much so that the method applied is still in operation. It has eliminated most personnel problems in the past eight years, and has completely solved the problem of personnel turnover. This distributor sends appropriate birthday gifts to each employee and member of his family and provides for each employee and his wife a company sponsored, "evening of dinner and dancing—or show" to celebrate their wedding anniversary. He even provides a baby-sitter. He states, "with this system, I have all of the wives on my team. They solve my personnel problems for me." While a fair wage must be paid for work performed, there are many advantages to things an employer does for his employees over and above the agreed wage. For example, a pat on the back for a job well done, or the completion of a rush job on schedule, will further compensate an employee and give him a feeling of satisfaction. Such a simple and inexpensive act will let an employee know that his efforts are appreciated. However, if this pat on the back is continually overlooked or neglected or considered not necessary, employees may not respond towards exerting a little extra effort when it may be needed.

Very often incentives, which are not of a financial nature, prove to be extremely effective, sometimes more so than additional financial awards. For example, the opportunity for advancement is particularly appealing to young men with an ambition to get ahead, and is a potent factor toward good employee relations. The opportunity for education is very appealing to both the young and older employees as it satisfies the ever present desire to learn. The Service Department that schedules regular training programs for its employees is on the right track toward bettering employee relations. A pride of connection appeals to every employee. The responsibility of putting such practices into operation rests with management. In a retail service operation, the continuation of these practices will make each member of the organization a salesman for the products or services offered. Inasmuch as our entire, mode of living is governed by a monetary system, a financial incentive, paid in the form of wages or compensation for productive work or service performed, is extremely important. In fact, this form of incentive is generally considered as being the cornerstone upon which all productive results are built. Since the manager of a business or department has, under his directive, a number of skills and job classifications, it is necessary that a wage payment system be established which will take care of all employees in a fair and business-like method.

A service manager, as a businessman, must consider any compensation plan from a fundamental standpoint of good business—as there must be value received for money paid out. A fundamental basis of a compensation system for a service department is that it attracts quality men, maintains an organization, provides for easy administration, and is fair. A retail service operation must also consider establishing a reasonable selling cost ratio and its position in a competitive market when planning a compensation plan. A reasonable selling cost ratio is necessary for the business establishment to realize a fair return on the investment, otherwise there is no incentive for the business to be continued. A position in a competitive market must be considered so that charges made for work performed will be within the limits set by the purchaser and competitor. This will enable a business to attract the necessary volume, or a fair share of the market potential. Any service operation must have a compensation system that will attract reliable, intelligent men in order to build a good organization. Since the turnover of manpower is very costly, sufficient income must be included in the system to hold the good men. Ease of administration will provide a better understanding of employee-employer relations, and will avoid instances of suspicion and doubt. It will also eliminate many of the details for handling a compensation system. Above all, the system must be fair since men of the same classification must be paid the same wage per unit of time or unit of work accomplished. Each man expects value for his outlay of effort or his work accomplishments. The system of compensation employed must justify his efforts.

There are several different types of wage payment systems commonly used in service operations; one of these is a salary system. This system provides for an employee to receive payment of a stipulated wage, at a rate per long unit of time—a week,—month,—year. It is usually applied to administrative personnel, or such key people in an organization as the shop or departmental foremen, parts and service managers. On occasion, there are some Service Departments, particiularly in some small operations, that pay mechanics on this salary basis. The advantages of the salary system provides for a guaranteed regular income which carries a certain amount of prestige and adds to an em-

ployee's sense of responsibility. However, the lack of additional incentive for greater efforts and the fixed expense of a salary system may be considered as undesirable by management. Furthermore, the salary system which does not include overtime may be unfavorable to an employee. A very popular wage payment system is the hourly rate. With this system, a stipulated wage payment is made for each hour spent on the job, and is usually applied to productive type labor such as, mechanics, machine operators, and welders. The advantages of the hourly rate system promote quality and pride of workmanship, greater flexibility for work assignments, simplicity in bookkeeping and payroll handling. While this method of payment is widely employed, some consider it as undesirable because it requires close supervision, offers no incentive for a mechanic to increase his productivity, adds to department's expense in case of unapplied time, gives variable cost of labor sales, and does not provide an accurate measurement of the shop's productivity.

Another method of wage payment is the flat rate system. While this method is not generally applied to the heavy duty service industries, there are certain fields where it is quite commonly used. The flat rate system is the payment of wages to an employee for the amount of work performed regardless of the amount of time taken to do the job. It is applied to some forms of productive labor, such as performed by a mechanic. While this system of payment promotes the maximum quantity of work, lessens the come-back expense, especially if the mechanic stands his own comebacks, rewards mechanics for skill and speed, eliminates cost of unapplied time, gives a constant and predetermined cost of sales, tends to make mechanics increase their production, simplifies cost accounting, and may require less shop supervision. There are, however, certain characteristics of the flat rate system that are considered by some as being quite undesirable. The lack of incentive for quality work may lead to an increased number of do-over jobs, and set up a requirement for closer inspection.

Regardless of the financial incentive system used, one important consideration is necessary—the fairness of the system to the employee and employer. This is essential for the successful operation of the method applied. The owner of a service operation has invested a given amount of money in the business, and he expects and should receive, a fair return on his investment in the form of profit. However, he, as one man, cannot perform all of the operations necessary in the everyday run of business; therefore, he employs other people to assist him. After selecting capable assistance, he sets up a system to pay these people, and for this monetary consideration, he justifiably expects all employees to be loyal, honest, and produce in comparison to the wages received. The employee, in turn, expects to enjoy the luxuries of life comparable to his position. While the employees' and employers' expectations may be miles apart, an equitable agreement on incentives, from the viewpoint of both parties, is very necessary for the successful operation of a service department or, for that matter, any business. Therefore, the key to the administration of any incentive system is fairness to all concerned.

Worthington Promotes Murray and Case

Mr. E. A. Murray has been appointed manager of the newly combined Sales & Service at the Worthington Corp. Compressor & Engine Division, Buffalo, N.Y., it is announced. Since 1951, Murray has been serving as manager of compressor sales. Replacing him in his former capacity is Everett L. Case. Sales and Service at the Buffalo Compressor & Engine Division have been combined as a step toward better customer relations. Mr. Murray is a graduate of Yale University where he obtained a B. S. degree in Mechanical Engineering. He joined Worthington Corp. in 1935 as a sales application engineer in the Compressor Sales Department and subsequently served as assistant manager of compressor sales, then manager of compressor sales. Prior to joining Worthington, he had been associated with General Electric Co. He is on the Executive Committee of the Compressed Air & Gas Institute, and is a member of the Compressed Gas Association and the Engineering Society of Buffalo.

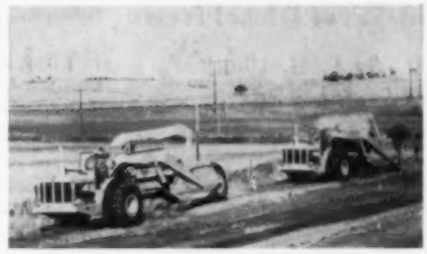
E. A. Murray

E. L. Case

Mr. Case is a graduate of Canisius College where he obtained a B. A. degree. He also obtained a B. S. degree in Mechanical Engineering from the University of Buffalo where he completed extensive graduate work in thermodynamics. In 1937 he joined Worthington's student training program. He served as a compressor application engineer, as special technical advisor and coordinator to the purchasing department, and then as supervisor of the oil refining and chemical section previous to his appointment in 1954 as assistant manager of compressor sales. Mr. Case is on the Educational Committee and sub-committee on Engineering Education of the Compressed Air & Gas Institute.

New Engine Powers Scraper

Allis-Chalmers has announced a new medium-sized motor scraper—the TS-260—a 44,800 lb. unit with 12.5 cu. yd. struck and 17 cu. yd. heaped capacity. The tractor is powered by the new Allis-Chalmers 16,000 six-cylinder diesel engine developing 230 hp at 2000 rpm that enables it to maintain a high favorable horsepower to struck yardage ratio of 18.4 to 1, as well as a horsepower to gross weight ratio of 1 hp to each 370 lbs. of gross weight. The scraper is hydraulically operated. Its source of power is derived from the gear-type pump driven from the rear of the engine crankshaft. Full engine torque is transmitted smoothly and easily to the transmission and final drive by a 17 in. single plate, dry-type constant capacity clutch with ceramic buttons that are resistant to heat, wear longer and require less frequent adjustments and service. The clutch is manually operated with an air assist roto-chamber connected to the linkage for ease of operation. Further operating efficiency in the new TS-260 is attained through its heavy-

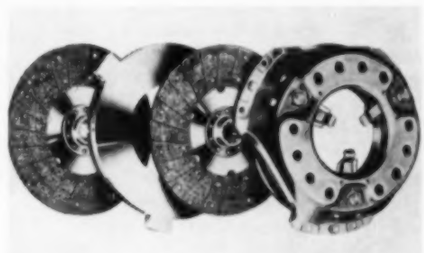


Two new Allis-Chalmers TS-260 medium-sized motor scrapers powered by the 16,000 6-cylinder diesel engine that develops 230 hp at 2000 rpm.

duty constant mesh Helical gear-type transmission. Contributing to the performance and long life of the transmission, as well as to the ease of operation, is the air actuated inertia brake on the counter-shaft to assist in upshifting. Shifting from lower to higher gears is swift, quiet and with minimum operator effort. A pump and filter built in the transmission keeps the entire assembly clean and completely lubricated, and adds to its life and operating efficiency. A patented, heavy-duty torque proportioning differential designed and built by Allis-Chalmers automatically controls the delivery of torque to the drive wheels, assuring maximum pulling effort under adverse conditions . (ITS NEW)

Heavy Duty Clutch Introduced

Lipe-Rollway Corp. has announced a 12 in. two plate DPB direct pressure heavy-duty clutch for truck, tractor, bus and industrial use. The 2 plate unit, with single plate cover, possesses higher burst strength and greater torque with lower pedal pressure than previous models. Friction-free internal linkage permits top mechanical efficiency—hysteresis curve of clutch releasing and engaging pressures are essentially the same. The 12 in. two plate DPB has an intermediate plate of extra rugged, close grain high tensile iron that resists warpage. Center plate is lug-type, providing more driving area. Drive mechanism is simplified assuring good alignment between plate and engine flywheel. Driving pin alignment is eliminated. Positive retraction of intermediate plate is possible during disengagement through compression type spring. Result is easier shifting. The DPB is available with rigid or dampener-type driven disc assemblies. Fac-



ing area is 298 sq. in. with unit pressure up to 25.9 lbs. psi. Priced to give lowest cost per mile operation, the new clutch has maximum release bearing load of 470 lbs. at full release. For further information on the 12 in. two plate DPB, write to Lipe-Rollway Corp., Clutch Division, 806 Emerson Ave., Syracuse 1, N.Y. (ITS NEW)

Mid-West Diesel News

By **L. H. Houck**

INLAND GM Diesel, Inc., Milwaukee, is the newly appointed Wisconsin distributor for the Detroit Diesel Engine Division of GM and one of their first deliveries was a GM 6031-C to repower a Cedar Rapids Junior tandem crushing plant for Pierce County Highway Dept., at Ellsworth.

CECIL Kain, Chicago, a 175 hp Cummins JT-6-B for repowering an IHC RD-205, from Cummins Illinois Engine Sales, Chicago.

ELL River Produce, Indianapolis, has installed a Cummins NH-220 in a Mack LJT. Sale handled by Cummins Diesel of Ind.

CATERPILLAR D-6 to W. T. Feazels, Mt. Home, Ark., for farm pond and terracing contracting, from Harrison branch of E. A. Martin Machinery Co., Springfield, Mo.

YELLOW TRANSIT, all diesel over-the-road freight line, operating 17,000 miles of routes in 9 states, with 1,570 pieces of equipment, is building a new $750,000 office headquarters at 92nd St. and State Line, Kansas City. It has more Kenworth tractors with Cummins engines on order.

MAUMEE Collieries, Linton, Ind., has repowered a Euclid 39-FDT with a Cummins NH-220-BI from Cummins Diesel of Indiana, Indianapolis.

SOUTHERN PLAZA, headquarters Dallas, one of the nation's largest over-the-road common carriers, has ordered for delivery by March 15, 74 Kenworth cab-beside-engine tractors and 336 Trailmobile high-cube trailers. Power on new Kenworths is Cummins NT-180 turbocharged diesel. Transmission is Spicer 12-speed Syncromaster with weight-saving aluminum case, Spicer 2-plate clutch, Timkin axles, Kysor aluminum radiator shutters, air-operated Cruiser-Master governor and Kenworth Model FTO-28 pusher-type bogey.

DENVER-CHICAGO Trucking Co., has now placed in service a number of units of its new order for International No. DCOT-405 tractors with sleeper cabs, v-belt drive pusher axles. Power is Cummins NH diesels.

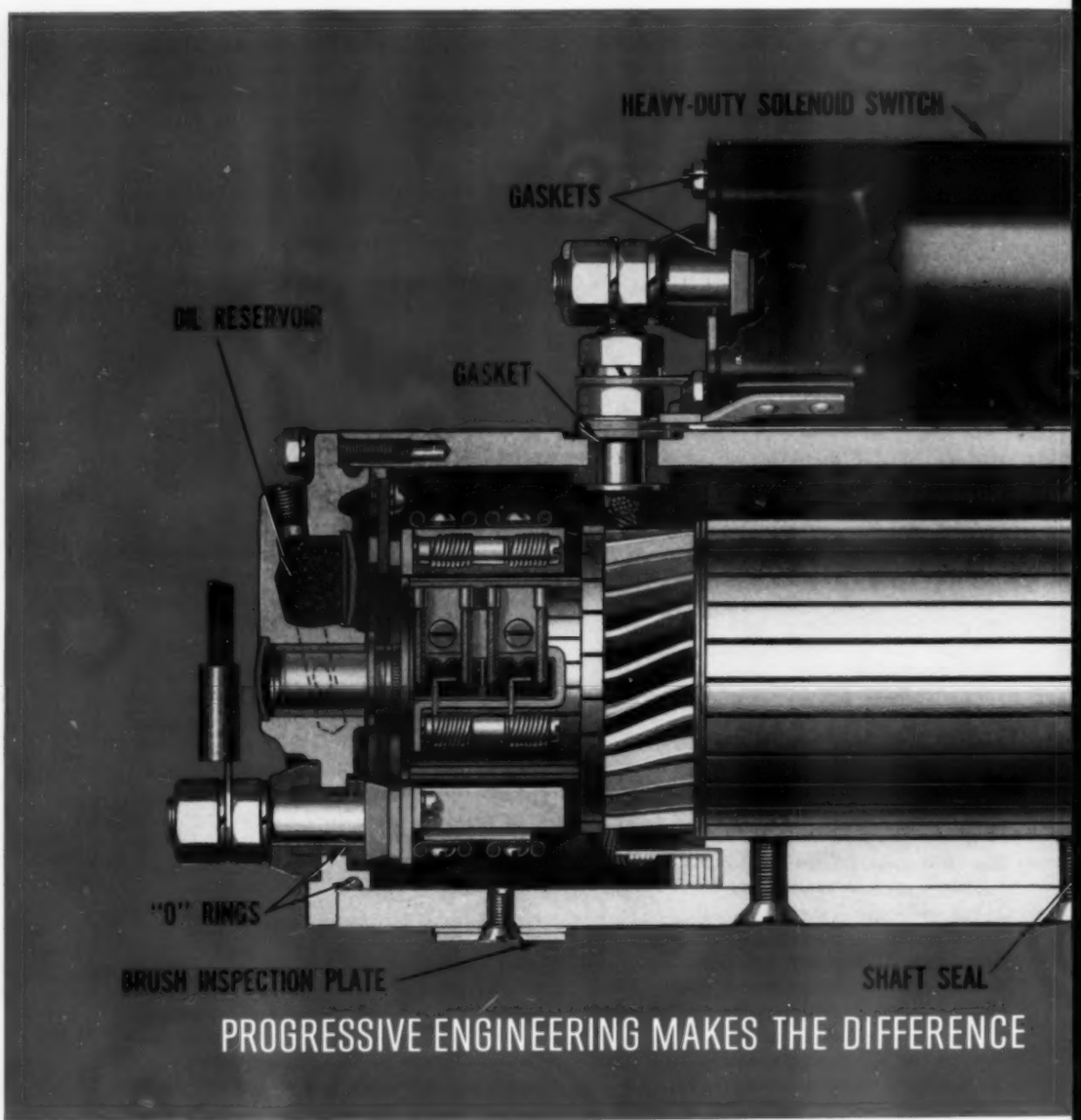
MORE than 70 D-4 Caterpillar tractors are being used in extensive lumber and logging operations around Crossett, Ark. This "small Cat" has become popular as a logger because of its small size and high power. Most of the units were sold by J. A. Riggs Tractor Co., Mc-Gehee, Ark., branch.

BURGER BOAT Co., Manitowoc, Wis., has taken delivery on a GM diesel, Model 2064-B, with 20 kw generator set for use on a new craft under construction. Delivery was made by new Wisconsin GM distributors, Inland GM Diesel, Inc., Milwaukee, of which Maynard T. Cole is president and general manager.

MORE Deutz air-cooled diesels for oil field work. Distributors announce delivery of three Deutz A4L514 to an oil company near Oklahoma City for driving mud pumps and two to an oil company at Tulsa, F3L712's for driving pipe cleaning machines.

FIVE Diamond T's have been added to the tractor fleet of Scott Truck Lines, Denver. Engines are Cummins NH. Transmissions R-96 Road-Rangers, Hendrickson RSOA-320 suspensions, Spicer 14-in. 2-plate clutches, Kysor radiator shutters, Bostrom No. 80 seats, Pittsburgh "Solex" windshields, Fontaine 36 in. 5th wheels.

UNION Carbide Nuclear and several other mining companies in the Four



PROGRESSIVE ENGINEERING MAKES THE DIFFERENCE

ANNOUNCING THE NEW DELCO-REMY TOTALLY

Delco-Remy now offers a completely new series of solenoid-operated, over-running clutch type heavy-duty cranking motors with the shift mechanism entirely enclosed. Special two-piece drive housings can be assembled to permit a total of 24 different solenoid positions with respect to motor mounting. New 50% longer brushes, together with sealing rings (optional) and large oil reservoirs (optional), assure extra-long operating time between overhauls. And Delco-Remy design features keep these heavy-duty cranking motors positively engaged until the engine starts. Engine manufacturers are invited to write directly to Delco-Remy for complete information and engineering assistance on the application of these new motors.

TOTALLY ENCLOSED DRIVE SHIFTING MECHANISM is protected against dirt, water, slush and ice. This enclosure plus the shaft seal and linkage seal also prevents transmission oil leakage.

TWO-PIECE DRIVE HOUSING DESIGN permits 24 different solenoid positions. Nose housings available in S.A.E. #2 and #3 mountings.

Corners area of Colorado have taken delivery on Deutz F3L712's and Deutz F4L's.

KENYON Dredging Co., Port Allen, La., now has its million-dollar Model 180 walking Bucyrus-Erie dragline, working on Canal 19 in Arkansas. Power plant is a 1000 hp Cooper-Bessemer, 8 cyl., JS-8, naturally aspirated engine. Air filter is Air-Maze, fuel oil filters Purolator and Commercial Full-Flo, alarm system Fulton-Sylphon working on high jacket water temperature and low lube oil pressure. It is excavating about 400,000 cu. yd. per month with a 15 cu. yd. bucket.

WESTERN Paving Co., Denver, an NH-220-BI Cummins for repowering a Mack LTH-2-D from Cummins Diesel Sales Corp., Denver.

NIGHTHAWK Freight System, Chicago, a Cummins NH-180 for repowering a Hendrickson BD-270, from Cummins Illinois Engines, Chicago.

KING Construction Co., Hesston, Kan., a 175 hp JT-6-B Cummins for repowering an IHC L-190 from Cummins Sales & Service, Inc., Fort Worth.

TWO NH-180 Cummins diesels to Ringsby Truck Lines, Denver for repowering White WF-7464-TR. Sale by Cummins, Denver.

FRED Fridley, Dickinson, N.D., a Cummins NH-220 from Cummins Diesel Sales, Inc., St. Paul, for repowering a Kenworth KC-523.

HYDE Construction Co., Jackson, Miss., has added a Case 100 crawler tractor to his fleet. This unit uses a 100 hp Case diesel, torque converter and loads with a 2 cu. yd. bucket. It can be used either as a tractor, dozer or high loader.

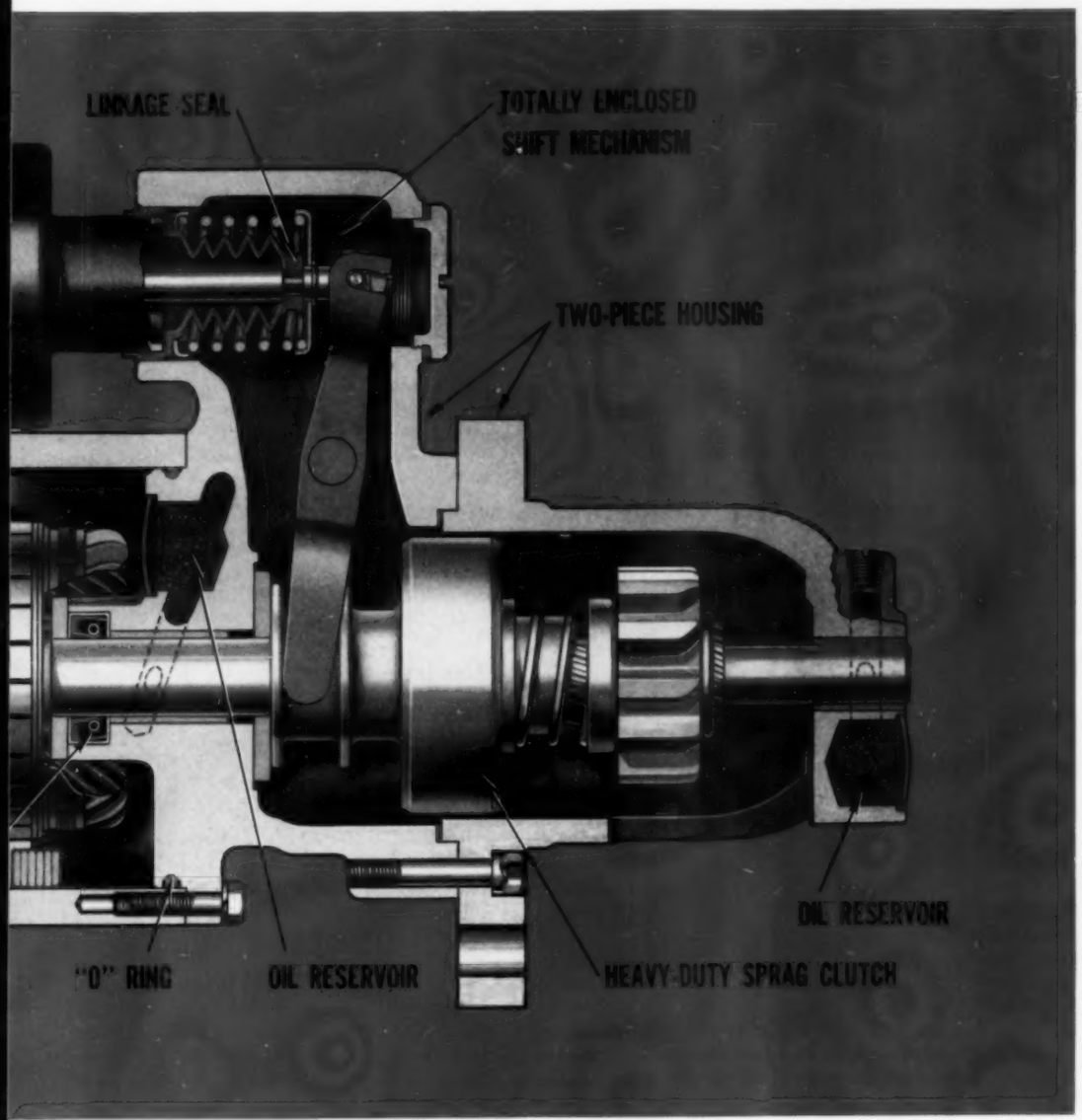
Baltimore Firm Selected

Machinery & Equipment Sales, Inc., 1012 Cathedral St., Baltimore, has been selected to represent American Air Filter Co., Inc., for the marketing in the Baltimore area of its air filter, dust control and engine & compressor products. These products formerly were represented by Air Filter Associates. President of the firm is C. A. Conklin, III. Associates are R. G. Vaughan, Jr., and John P. Johnston.

Production Road Issued

"The Lowly Shrimp Spawns a Mighty Industry" is the title of the feature story in the latest issue of Twin Disc Clutch Company's magazine, Production Road. How the shrimp was transformed from an exotic delicacy to the nation's most popular seafood is told in this story which also contains interesting and little-known facts about such colorful customs as "shrimp dancing" and "the blessing of the fleet." Twin Disc produces of marine reverse and reduction gears for shrimp boats as well as other types of fishing vessels. Another story of unusual interest in the current issue concerns a rubbish crusher recently put into operation by the city of Racine, Wis. Reports indicate that this new machine may go a long way toward solving municipal rubbish disposal problems. Nine additional features cover installations involving earth mo.ing, road building, petroleum processing, drilling, machine tools, and materials handling. Details of a new cross-licensing agreement between Twin Disc and Germany's Ortlinghaus firm are also reported in Production Road. This agreement gives Twin Disc exclusive manufacturing and sales rights to Ortlinghaus Electro-magnetic Clutches in the United States and Canada. A copy of the magazine may be obtained by writing The Editor, PRODUCTION ROAD, Twin Disc Clutch Co., Racine, Wis.

ITS NEW



ENCLOSED HEAVY-DUTY CRANKING MOTORS

HEAVY-DUTY SOLENOID AND SWITCH provide positive pinion engagement and safely handle maximum starting current. Special seals increase contact life.

SPRAG CLUTCH DRIVE operates with non-chamfered ring gear. Pinion indexes on spiral spline, positively engages ring gear before power switches on, and does not become disengaged with sporadic engine firing.

HEAVIER BRUSH INSPECTION PLATES resist damage from use and handling—are sealed to prevent leakage to motor interior.

GENERAL MOTORS LEADS THE WAY—STARTING WITH

Delco-Remy

GM GENERAL MOTORS

ELECTRICAL SYSTEMS

DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

ADDED POWER FOR ROUGH ROAD PROJECT

By ROBERT DYMENT

A DIFFICULT road construction and relocation job in Western New York will be completed in the Spring of 1959—a job that has put diesel driven heavy construction equipment through some of the roughest work encountered anywhere—diesel equipment that was hooked together in units for added "pull" power. The project is located between the villages of Cassadaga and Fredonia in Chautauqua County, the westernmost county in New York State and is for the relocation and rebuilding of an eight mile strip of New York Route #60, a main highway connecting the southern portions of the county with the north. S. J. Groves & Sons, Minneapolis, Minn., are general contractors for the project. Officials of the contracting firm said that the $2,559,884.00 construction job to change Route #60 began in September, 1957, with the contract calling for completion by December, 1959. The changes are designed to eliminate curves and hills in the highway and to make the New York State Thruway more accessible to residents of Southern Chautauqua County.

The Buckley Hill cut and fill operation has been the scene of one of the biggest headaches on the job. From this cut, which is about in the middle of the eight mile road project, 400,000 cu. yd. of soft, pliable, silty clay had to be removed. The cut was 485 ft. wide, 52 ft. deep and 1,600 ft. long. When work started on this cut, the operators soon found that in many sections of the area there were hidden underground springs. The diesel tractors and scrapers sank deep into the muck and much time was spent by the contractor removing the equipment from the traps. Thus a routine job became a herculean task and it soon became apparent that another method had to be devised to keep the equipment moving. It was decided that additional "pull" power was needed. As many as six 1200 rpm D-8's were hooked together to pull one No. 80 Cat Scraper. A 1½ in. cable was hooked up to tie the six D-8's together.

The roar of the dieselized equipment pushing and shoving the blue clay from the cut to former farmland could be heard as motorists passed the construction area on the old road south to Cassadaga. One D-6 Caterpillar tractor; seventeen D-8 diesel powered Caterpillar tractors, equipped with bulldozer blades; one D-9 tractor; three Allis-Chalmers HD-20's; one Allis-Chalmers HD-21; 14 scrapers were involved in the operation, which as long as the weather held out was continued 20 hours a day in two 10-hour shifts.

The D-6, like all Caterpillar-built machines, is powered by a Cat diesel engine. It is a 6-cylinder, 4½ in. bore by 5½ in. stroke engine, developing 93 flywheel, 75 drawbar hp at 1600 rpm. The D-6 can develop up to 19,000 lbs. pull at the drawbar. The D-8 has a 6-cylinder, 5¾ in. bore by 8 in. stroke Cat diesel engine, developing 191 flywheel, 155 drawbar hp at 1200 rpm. The direct drive transmission model can develop up to 45,020 lbs. pull at the drawbar. The D-9 has a 6-cylinder, 6¼ in. bore by 8 in. stroke Cat diesel engine, with 320 flywheel, 260 drawbar hp at 1240 rpm. It can develop up to 63,000 lbs. pull at the drawbar. The No. 80 Caterpillar scraper can carry up to 23 cu. yd. (heaped) and weighs about 30,000 lbs. empty. It too, played a big part in the Route #60 job. With six D-8's hooked together to pull one scraper, approximately 1,146 hp or 270,120 drawbar lbs. pull was developed. The Allis-Chalmers HD-20 tractors utilized on the project were all powered with 175 hp diesels with Twin-Disc torque converters. The HD-21 is Allis-Chalmers' new diesel crawler tractor powered with the company's new 225 hp 21,000 engine.

Then came another big problem. Originally specifications called for using nearby clay with gravel sandwiched in alternating layers as fill for the cut area. One foot of gravel and five feet of fine silty blue clay was utilized as the fill. When heavy rains hit the fill during the summer, however, the "sandwich" turned out to "have too much mayonnaise" and began settling and sliding sideways badly. Consequently, the specifications had to be redrawn, all of the original fill dug out, again through diesel team work, and a completely new gravel fill hauled in from a pit nearby.

During the height of the two 10-hour daily shifts, lubrication and fuel trucks went right out in the cut area to service the diesel-powered equipment between shifts, in order to save time. The service vehicles were able to fuel and lubricate two rows of diesel powered construction equipment at a time. This was accomplished by having all equipment lined up in two rows, leaving enough space between them so that the service vehicles could go down through the center, fueling and lubricating two machines at a time. All that remains on this great road relocation job is one mile of paving in the "tricky" Buckley Hill Cut area, which, with a break in the weather, will be accomplished this spring. Officers on the project are: J. F. Vallone, Project Manager; Harry M. Johnson, Jr., Project Superintendent, who has now left for another S. J. Groves & Sons Company project; R. E. Hynes, project superintendent; Wally Roher, Project Engineer, and W. J. Bell, office manager.

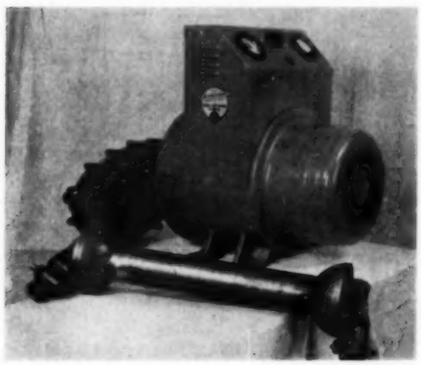
600,000th Air Compressor Produced

To mark a total of 600,000 air compressors manufactured, Quincy Compressor Co. presented the 600,000th unit sold as a free gift to Louis V. Bruer, vice president of Southern Petroleum Co., Memphis, Tenn. Credited with the sale is The Southern Co., Inc., Quincy distributor in the Memphis area. Mr. Bruer came to the United States several years ago after he escaped from communist Yugoslavia by rowing a boat from the western Yugoslavian coast to the eastern coast of Italy. He has already established an outstanding business record with Southern Petroleum Co. and is a devoted spokesman for America. Taking part in the award ceremony were President Mac Irwin, Quincy Compressor Co. and Quincy Sales Manager, Loren Gillhouse.

Left to right: Louis V. Bruer, vice president, Southern Petroleum Co., Memphis; Jim Semke, Quincy Compressor Co., sales engineer, Memphis area; Mac Irwin, Quincy president; and Loren Gillhouse, Quincy sales manager.

Brushless Emergency Generator

Katolight announces a new low-cost series of ac generators particularly designed for tractor-drive farm emergency application. Sizes presently available are 7500 and 15000 watts, 115/230 volt, ac. The generator features new brushless construction, life grease-sealed ball bearing and drip-proof construction, also, a heavy duty control box, complete with field rheostat, voltmeter, frequency meter for accurate speed adjustment, and an automatic voltage regulator providing better motor starting ability and holding voltage within safe limits. The generators are adaptable to both belt and power take-off drive with the latter gearbox and drive shaft readily attached in the field. The PTO models,



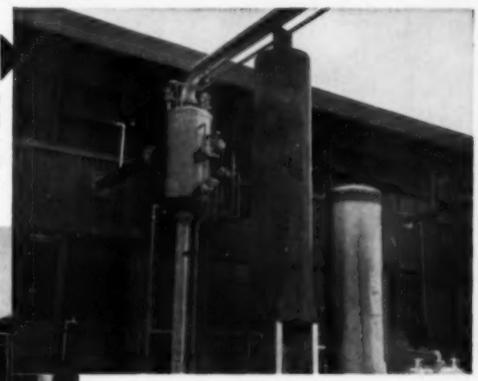
also, can be supplied on a rugged steel trailer for easy portability. For a complete descriptive brochure, write Katolight Corporation, Mankato, Minnesota. (ITS NEW)

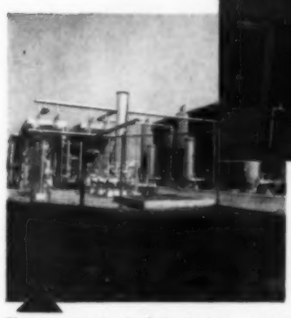
VAPOR PHASE®
THERMAL CIRCULATION PERMITS DOLLAR-SAVING REMOVAL OF JACKET WATER PUMPS

Installed in 1952 for a Long Beach Oil Company, this VAPOR PHASE® Unit has Long Since Proved Its Economy of Operation and Smooth, Trouble-Free Performance.

Steam is manifolded from three Clark Bros. 550 hp engines to a single VAPOR PHASE® Unit.

Steam from this VAPOR PHASE® Separator, as well as lube oil and compressor cooling water, are all cooled in aerial condensers.





The parasitic load of the jacket water pumps is completely eliminated by use of VAPOR PHASE® Thermal Circulation.

FOR FURTHER PROOF on how a VAPOR PHASE® installation can bring new economy into your operation, write for recommendations. No obligation.

"Sole Developers and Manufacturers of Vapor Phase® Thermal Circulation (Ebullition) Engine Cooling Systems"

E C VAPOR PHASE

ENGINEERING CONTROLS Inc.

An Affiliate of St. Louis Shipbuilding & Steel Co.

611 E. Marceau St.
St. Louis 11, Mo.

1939 N. Hillhurst Ave.
Los Angeles 27, Calif.

Michigan-Ohio News

By Jim Brown

DETAILS of engineering recommendations for an $18 million bridge connecting the United States and Canada at Sault Ste. Marie, Mich. and Ontario, have been announced by the highway departments of Michigan and Ontario and presented to the International Bridge Authority. The bridge and approaches would be 12,000 ft. long, exclusive of toll plazas providing two 14 ft. traffic lanes plus 2 ft. emergency walkways on both sides.

CUMMINS Diesel Michigan Inc. reports that Short Freight Lines of Bay City, Michigan has started to dieselize their fleet by installing four JT-6-B (175 hp) Cummins diesels in their R-195 IH tractors. They will be used on Short's regular freight hauls from Detroit to the Upper Peninsula.

ON page 72 (our monthly column) of the February issue we mistakenly reported the sale of an Ingersoll-Rand air compressor to H & H Construction Company by Cyril J. Burke, Inc. This unit was instead sold by the R. G. Moeller Company, local distributors of Ingersoll-Rand. Sorry . . . we'll wear the dunce cap.

AN OC-46 Oliver front-end loader (⅝ yd.) featuring "spot turn" and powered by a Hercules model OC-43D diesel engine was recently purchased from Cyril J. Burke, Inc. of Detroit by Gerald Haltner from Alpena, Mich.

GREAT Lakes Steel Corp. of Ecorse, Mich. has purchased a model 6055C GM Detroit diesel for installation in an American Hoist and Crane. Engine supplier is Peninsular Diesel Inc. of Detroit.

AN Allis-Chalmers model HD21G (66,500 lbs. with 4 cu. yd. bucket) has been delivered to Great Lakes Steel for use around the blast furnaces. Sale of the engine was made by Earle Equipment Co. of Detroit.

INTERNATIONAL TD-9 crawler tractor was sold to Union Construction Co. at Manchester, Mich. The tractor was purchased from Wolverine Tractor and Equipment Co. of Grand Rapids and Detroit.

C. J. ROGERS Co. of Detroit has accepted delivery on a Case model W-9 Terraload'r equipped with 4-wheel drive and powered by a 4-cylinder, valve in head diesel engine. The sale was made by the J. R. Panelli Equipment Co., Inc. of Detroit.

APPOINTMENT of Donald F. Ball as manager of Ford Division's heavy truck sales department was announced by Walter J. Cooper, Ford Division general sales manager. Ball succeeds John F. McLean, Jr., who has been named executive assistant to the regional sales manager at Ford's Midwestern regional sales office in Chicago.

U. S. AIR FORCE has just purchased two 150 kw 480 volt (1200 rpm) AC generator sets for use at Kinross Air Force Base near Sault Ste. Marie, Michigan. The new generator sets are powered by two NVH-12-1 Cummins diesel engines with a maximum of 420 hp. They will be run in parallel with a good deal of complicated switch gear which was engineered by the Morgan Industries of Detroit. The Cummins engines were supplied by Cummins Diesel Michigan Inc. of Dearborn, Mich.

A 1¾ yd. Northwest model 6 pullshovel was recently sold to George Tripp of Pontiac, Mich. The new Northwest is powered by a Murphy model 20 diesel engine and was purchased from Cyril J. Burke, Inc. of Detroit.

Better Injectors... Lower Cost...

NEW KENT-MOORE SERVICE EQUIPMENT SPEEDS OVERHAUL AND REPAIR OF GM DETROIT DIESEL INJECTORS

GM Detroit Diesel Injector Comparator Tests performance under simulated operating conditions. Eliminates all guess-work in overhauling and rebuilding injectors to factory specifications. When used with Injector Tester, the condition of all operating parts can be determined. Unnecessary replacement of parts eliminated. With Kent-Moore's J 7041 Diesel Injector Comparator you "road test" GM Injectors right in your shop!

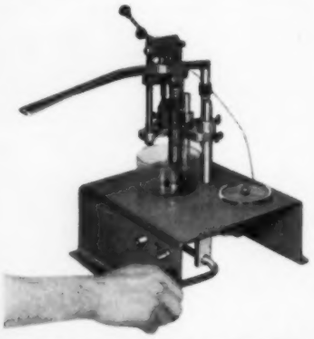
Developed in cooperation with the engine manufacturer, the K-M Injector Comparator measures actual output of new, used or rebuilt injectors by testing them at a fixed speed at a specified number of strokes with filtered fuel supplied at uniform service pressure.

HANDLES ALL SERIES 71 AND 110 INJECTORS

Now you can scientifically test new or rebuilt injectors before building them into the engine—and you can even match-up sets of GM injectors with uniform delivery rates for the best engine performance!

SEND FOR BULLETIN—Write for full data on these and other Kent-Moore special service tools and equipment.

Trade in your old injector tester! K-M Testers purchased within the last three years are worth $75.00 to you! Older models or any make of pump-type testers, bring $25.00 trade-in allowance.



INJECTOR TESTER FOR POPPING, SPRAY PATTERN, HIGH AND LOW, AND PRESSURE LEAKS. The redesigned J 7509 Injector Tester used rigid steel tubing to closely regulate the circuit's volume of fluid. Microfilters eliminate dirt, the greatest single element of injector trouble, and a special cam-operated clamp supplies just the exact amount of pressure for perfect sealing during test. The J 7509 Tester will handle both standard body and offset body Series 71 injectors.

ADAPTER KITS. The J 7510 adapter kit is composed of a quick-clamp and support plate designed specifically for standard body Series 110 Injectors. For the offset body Series 110 Injectors, the J 7511 Adapter Kit is used. These parts are installed on the J 7509 Injector Tester in place of the Series 71 unit.

INJECTOR ASSEMBLY FIXTURE. The J 6868 Injector Assembly Fixture provides a quick-clamp fixture to retain the Series 71 Injectors for repair or reassembly. Jaws are available to fit all Detroit Diesel Injectors.

JAWS AND SUPPORT ASSEMBLIES. Jaws and support assemblies are available to adapt the J 6868 Injector Assembly Fixture to handle all the Detroit Diesel Injectors. J 7505 Standard body Series 110, J 7784 Offset body Series 110, J 7506 All Series 51.

KENT-MOORE ORGANIZATION, INC.

28635 MOUND ROAD, WARREN, MICHIGAN 58-F-6

ENGINEERS AND MANUFACTURERS OF SERVICE TOOLS AND EQUIPMENT

UNION Construction Co. of Manchester, Mich. has a new model 30B Bucyrus-Erie backhoe powered by a Caterpillar model D318 diesel engine. The sale was made by Wolverine Tractor and Equipment Co. of Grand Rapids and Detroit.

THE Hydraulic Concrete Breaking Co. of Livonia, Mich. has just purchased their 4th Oliver model 88 Hydrotrencher from Cyril J. Burke, Inc. of Detroit. The Oliver model 88 has a ½ yd. backhoe and is powered by a 6-cylinder Hercules diesel engine.

AN Austin-Western Super 99 grader powered by a GM model 4-71 Detroit diesel engine and torque converter was recently sold to Whitaker-Gooding Co. of Ypsilanti, Mich. The Austin Western grader features a 6-wheel drive and steers on all six wheels. The wheels can be offset making it highly adaptable in ditching and sloping work. Sale was made by R. G. Moeller Co. of Detroit.

GREAT Lakes Steel Corp. of Ecorse, Mich. has accepted delivery on a model 71-B Bucyrus-Erie shovel with a Clamshell bucket. The Bucyrus-Erie shovel is powered by a Caterpillar diesel engine, weighs 153,000 lbs. and was purchased from Wolverine Tractor and Equipment Co. of Grand Rapids and Detroit.

JOSEPH Wilson of Fraser, Mich. is installing a Cummins model HRC-4-M diesel rated at 115 hp @ 1800 rpm. The new Cummins is going into a 39 ft. 5 in. single screw, steel hulled pleasure boat, and will be coupled with a Twin Disc model MG-71 with a 2 to 1 reverse and reduction gear. The engine supplier is Cummins Diesel Michigan Inc. of Dearborn, Michigan.

CYRIL J. Burke Inc. of Detroit has just delivered a 1 yd. Northwest model 41 pullshovel to D'Angelo-Policelli. The Northwest will be used for general excavating and sewer work and is powered by a Murphy model 12 diesel engine.

EARLE Equipment Co. of Detroit reports the sale of a model 405 Koehring dragline equipped with a 1¼-yd. sand and gravel bucket and powered by a GM model 3055C Detroit diesel engine. The new Koehring was sold to O. E. Gooding Co., of Ypsilanti, Mich.

MICHIGAN Silica Co. of Rockwood, Mich. has a new model 51-B Bucyrus-Erie 2½-yd. shovel. The new Bucyrus-Erie is powered by a Caterpillar diesel engine, weighs approx. 125,000 lbs. and was purchased from Wolverine Tractor and Equipment Co. of Detroit and Grand Rapids.

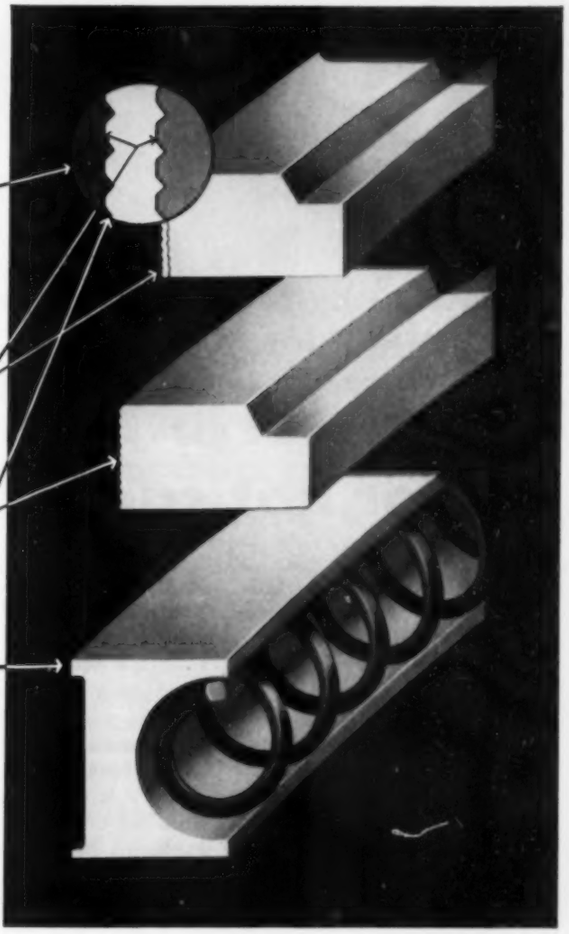
New Hercules Distributor

Drillers Engine and Supply, Inc., 5120 S. Shields St., Oklahoma City, has been appointed Oklahoma and Texas panhandle distributor for Hercules Motors Corp. The Oklahoma City company, which also has a branch at 124 N. Boston St., Tulsa will handle Hercules' entire line of air-cooled and liquid-cooled diesel, gasoline and LPG (liquefied petroleum gas) engines and power units for automotive and industrial equipment. Hercules engines range in capacity from 1 to 600 hp. One of the largest petroleum and industrial equipment firms in Oklahoma, Drillers Engine and Supply was founded at its present location in 1945. Its facilities total some 16,400 square feet—9,400 in Oklahoma City, 7,000 in Tulsa. In addition to Hercules engines it distributes Perry water filters, Wahlberg-McCreary air and gas starters, Techno electric starters, Pedrick piston rings and Peco oil and gas filters. In addition to sales representation work, the corporation does a large volume of mechanical service work (with engine work a specialty), machine work and welding.

How Perfect Circles are engineered for

SEVERE DIESEL SERVICE

Precise pressure and pre-seated hard, solid chrome doubles life of rings and cylinders.



PRECISE CONTROL of correct ring pressure distribution for any particular type engine *plus* a pre-seated surface on ring face assures long life and eliminates tedious break-in period.

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CHROME 86 OIL RING features solid chrome plated steel faces to resist extremely high diesel pressures without scuffing, scoring. The result: thousands of hours of positive oil control and double life for pistons, rings, and cylinders.

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PERFECT CIRCLE

PISTON RINGS AND POWER SERVICE PRODUCTS

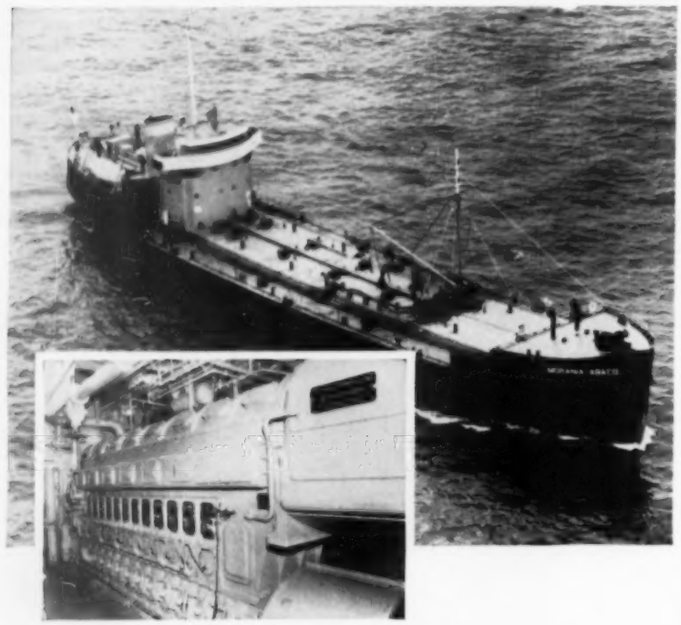
Hagerstown, Indiana — Don Mills, Ontario, Canada

Florida Diesel News

By Ed Dennis

TRIBUTE to the Florida shrimping industry was the launching of the 72 ft. *Lady Kossie* by Diesel Engine Sales of St. Augustine. The trawler, #800, was delivered to the Estero Shrimp Co., Inc. of Fort Myers and is powered by a General Motors 6-110 diesel engine.

AT Starke, Charley Cox sub contracted to move 229,437 cu. yds. of rock material for road construction work. He is using three T. S. 200 Allis-Chalmers diesel driven scrapers. An HD16 Allis-Chalmers dozer with an Allis-Chalmers 844 cu. in. 163 hp diesel engine is used to push load on the same job.



Fairbanks-Morse O-P Power gives the new "Morania Abaco"

high-performance for hot cargo!

Capable of delivering 17,700 barrels of asphalt at 350°F. anywhere on the East Coast or in the Gulf, the new O-P powered *Morania Abaco* has literally revolutionized the asphalt industry. Time is saved; packaging, shipping and labor costs are cut to the minimum.

For compact power, and economy, a 12-cylinder Fairbanks-Morse Opposed-Piston diesel was selected for the *Morania Abaco*, developing 2000 hp. at 800 rpm. O-P performance gives her the extra speed and efficiency that adds to her effective operating range. Whether you're building new or repowering, call in your nearby Fairbanks-Morse Marine expert. F-M O-P diesels range from 300 to 3000 hp. Write Fairbanks, Morse & Co., 600 South Michigan Avenue, Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

DIESEL, DUAL FUEL AND GAS ENGINES • LOCOMOTIVES • ELECTRIC MOTORS • GENERATORS
PUMPS • SCALES • COMPRESSORS • MAGNETOS • HOME WATER SYSTEMS

MODEL NH220 Cummins diesel engine was used to repower a locomotive at the Southern Wood Preserving Co., East Point, Ga., and a similar model went into a DC75T Auto-car tractor for Dave Johnson, Atlanta, Ga. These Cummins diesels are rated 152 hp.

THE R. P. M. Diesel Engine Co., Fort Lauderdale supplied a General Motors 6030-C diesel rated 164 hp to the A. J. Sullivan Farms of Belle Glade to supply power for a 42 in. G. & H. turbine water pump rated 35000 gpm at seven foot head.

AT Fort Myers, the Glades Lumber & Wood Treating Co. repowered a pole stripper machine with a model O. M. 321 Mercedes-Benz diesel engine. This 3¾x4¾ engine is rated 96 hp at 2600 rpm.

FLORIDA Georgia Tractor delivered to the Meekins Stone Quarry at Fort Lauderdale, two #55 International Payscrapers, 14 cu. yd. heaped capacity, powered with model HRBI Cummins diesel engines rated 172 hp at 1800 rpm.

AT Fort Lauderdale, Ellis Diesel Sales & Service Co. repowered the 70 ft. *Sangamo* for the Eastern Military Academy of N. Y. with a pair of General Motors 6-71 diesels using the original Twin Disc 2:1 r&r gears and Bendix Westinghouse air controls.

SHELLEY Tractor & Equipment Co., supplied the ninth model 342T Caterpillar marine diesel engine to the General Marine Boat Yard of Fort Myers Beach, for installation in a trawler. General specifications are 200 cont. hp at 1200 rpm or an inter. hp of 240 at 1300 rpm, a 52x35 Columbian four blade propeller and 2.96:1 r&r gears.

AT Key West, Charley Toppino & Sons took delivery of a P&H diesel engine model 487C-18A with Fuller 10B-11 transmission. This two cycle four cylinder diesel is rated 200 hp at 1800 rpm and was installed in a Diamond T dump truck.

GENERAL Engine & Equipment Co. of Tampa supplied a General Motors 6031-C diesel engine with direct drive and a G. M. power take-off to the Proveau Lumber Co. of Nacatee for power to run a portable saw mill.

WAUKESHA model 195 DLCA rated 84 hp at 2000 rpm supplies power for the 2¾ yd. Scoopmobile being used by the L. C. Morris Construction Co. of Miami.

ENTERPRISE powered 96 ft. *Sewart Dredge #1* is now working in Cuban waters while #2 is pumping the approaches for the new St. Petersburg bridge. Both are powered with 1040 hp Enterprise diesels for their 16 in. pumps and have a model DSG6, 575 hp, generating unit with 450 kw Westinghouse generators.

SUNNYLAND Lime Rock Co. of Tampa took delivery of a model 4013-C General Motors diesel with Snow Nabstedt 2:1 r&r gears to repower a rock crusher. Also included were extra heavy duty air breathers from General Engine & Equipment Co., Tampa.

THE *Ino*, a French West Indies freighter of Fort De France, Martinique is being repowered at Dade Drydock with a model 40-MSX-8 Superior diesel engine rated 600 hp at 800 rpm with 3:1 Snow Nabstedt r&r gears.

AT Fernandina Beach, Sherman Evans built a 65 ft. shrimper and powered it with a model HRM Cummins diesel from the Jacksonville Branch of Cummins Diesel Engines of Florida. This six cylinder diesel has 3:1 Twin Disc r&r gears and is rated 127 cont. hp at 1800 rpm.

TESORO DE LOS ISLAS is the new name of the 228 ft. passenger vessel *Liberty Bell* powered with twin General Motors 12-278A diesel engines. It has a service speed of 12 knots and will operate between Batabano and the Isle of Pines, Cuba as a combination cargo and passenger vessel.

THE 100 ft. *Highlander*, owned by Bruce Forbes, was chosen to lead the annual Miami International Boat Show's Aqua Parade on February 22nd. Two General Motors 6-110 diesels power this new craft for a speed of 13 knots.

CAPELETTI Bros., road contractors of Hialeah, recently acquired a model H. U. Payloader tractor shovel powered with a Hercules DIX6 diesel engine rated 84 hp.

DETROIT Diesel, Florida Br., Miami, recently delivered to the Stevens Food Market of Wilton Manor, a 200 kw generator model 12-103 and a 3030-C General Motors diesel rated 67 hp at 1800 rpm to Arvida Nurseries to power a Stang water pump.

INTERNATIONAL COE hiway tractor is being used to pull the semi-trailer for the Farmers Hatchery & Supply Co. of Evansville, Ind. to Miami, Fla., each with 400 cases of hatching eggs for Cuban farms, power is supplied by an NH180 Cummins 180 hp diesel and an 8 speed Fuller transmission. A Luberfiner lube oil filter is used in the system. With speeds up to 60 mph, the trip takes 35 hrs. traveling time.

Inland River Report

By **A. D. Burroughs**

THE 58th tug to see service for Moran Towing & Transportation Co., is the new, neat 100 ft. *Nancy Moran*, built by Jakobson's Shipyard, Oyster Bay. The tug's rated 1600 hp comes from a GM (Cleveland) 567C engine.

A number of unusual vessels have hit the waterways, including the plastic craft, the *Glass Slipper*. The 65 ft. experimental boat was completed by the Texas firm, Plastic Boats, Inc., for Plastic Research Inc., with 1200 hp developed from two Cummins VT-12-M engines.

TESTING trials are in progress for the diesel-electric craft built by Missouri Valley Steel, Inc. The 75 x 28 ft. vessel is equipped with a pair of 500 hp GM 8268-A engines driving 620 volt Westinghouse generators and motors.

NEW craft for specialized duty is the vessel constructed by E. W. and A. P. Dupont, Inc., Morgan City, La., for Miami, Fla., Seaquarium. The twin-screw craft, powered by twin GM 6-110's, will be used to collect live marine specimens.

CONSTRUCTION record of 1,000 vessels has been chalked up for Sewart Seacraft shipyard, Morgan City, La., with the completion of the 32 ft. sedan cruiser built for Service Boat Co., Berwick, La. Power for the craft is supplied by a GM 6-71 engine.

MERCHANT PRINCE is the new beauty for a new company, Western Rivers Navigation Co., Pitts. The 148 x 34 ft. towboat, one of Dravo's 3200 series, has 3200 hp received from a pair of GM Cleveland engines.

THE spurt of new construction projects is evident, with a new towboat under construction at Yates Marine Construction, Wheeling Island, for Merdie Boggs and Sons, Flatwoods, Ky. The 54 x 19 ft. towboat will be equipped with two diesel engines, as yet unselected.

Busy Humboldt Boat Service yards at St. Louis have two twin towboats underway. Measuring 44 x 15 ft., the 200 hp for one of these twins will come from a Caterpillar D-337-F, and the other from a Cummins NRT-6-M.

TWIN-screw towboat for Southern Illinois Sand Co., Chester, Ill., is due for late spring delivery from Missouri Dry Dock & Repair Co., Cape Girardeau, Mo. Power for the 50 x 19 ft. vessel will be supplied by two yet unselected 220 hp engines.

THE mile-and-a-quarter length single-file tow plying the Illinois River suggested proof to the saying "in unity is strength". Four popular pushers teamed up to move this record-length tow, the 3200 hp Fairbanks-Morse-powered *Frances Anne*, the *Coal King* with GM power, the *Franklin D. Roosevelt*, and the *Fleetwood*. This team has a collective total of 60 years diesel service.

ON the water, we spotted the *Theresa Seley* with a sizable tow of alumina. Built by Dravo, and owned by Seley Power, Inc., this 200-ft. towboat has 6,000 hp from two Nordberg Supairthermal engines.

A special thank-you to the reader sending the enlarged photo of the beautiful *Linda Brooks*. This versatile craft, at home on lake, river or canal, was built by Parker Brothers, Houston, for the Brooks Liquid Transport, Inc., Chicago. The 1600 hp is developed from two Superior engines.

IN answer to inquiry, the *J. S. Lewis*, towboat operated by Amherst Barge Co., is accurately listed as a diesel craft. For years an active steamer, the vessel has been repowered with Enterprise engines.

WAUKESHA turbocharged engines get favorable performance reports on the fast steel tug, *Michele A. DeFelice*. Engine installation for the 80 ft. craft was handled by New Orleans firm, Reagan Equipment Co.

New Filter Distributor

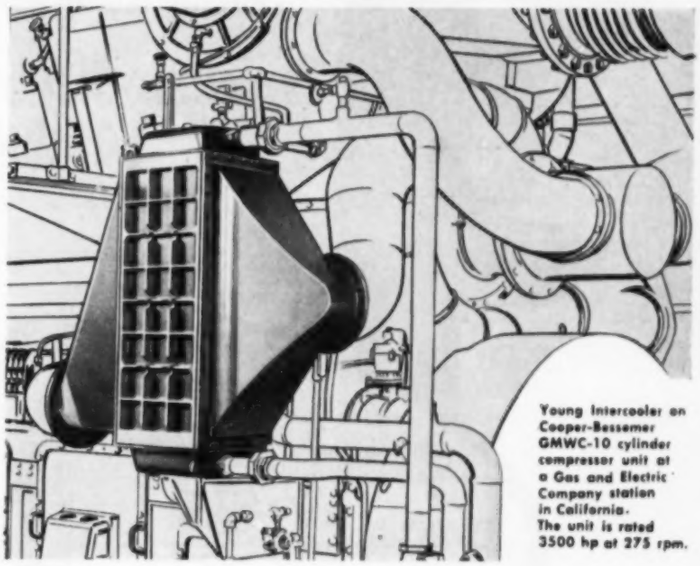
Mr. Oke W. Muller, president of Power Specialty Co., announces that Power now represents Indiana Commercial Filters Corp. The CFC product line includes Honan-Crane and Michiana Filters for micro-clarification of all types of oils; impregnating oil dehydration units; magnetic separators; automatic tubular conveyors; coolant clarifiers; and settling tanks. The Houston headquarters of Power Specialty Co. is at 2000 Kipling St. Dallas office, under the direction of George Whittet, is at 4512 Central Expressway.

High Efficiency Automatic Filter

The American Air Filter Co. announces the type B Rollotron, which is a new design of the basic Rollotron agglomerator-filter principle introduced exclusively by AAF. The new Rollotron combines the high efficiency of an electronic precipitator with the low maintenance of an automatic, renewable media filter. In the Rollotron, dry, electrostatically charged plates are used to agglomerate atmospheric contaminates—such as dirt, bacteria, pollen, smoke, etc. The agglomerated particles (including submicron sizes) are held together by intermolecular attraction until they are picked up by the air stream and deposited in the renewable media of the storage section. There the accumulated dirt is automatically wound into a compact roll for disposal. In the Rollotron resistance to air flow is uniform and constant. The new type B Rollotron is compact, requiring minium space in direction of air flow and is easy to install and maintain. Since it is not necessary to wash the plates water connections are not required and freezing problems are eliminated. For additional information, please write Department PD, American Air Filter Co., Inc., 215 Central Ave., Louisville 8, Ky. (ITS NEW)

Young INTERCOOLERS

help get maximum efficiency from turbocharged engines



Young Intercooler on Cooper-Bessemer GMWC-10 cylinder compressor unit at a Gas and Electric Company station in California. The unit is rated 3500 hp at 275 rpm.

Young engineering pays off with more power, more efficiency

Here is another specific example where quality and dependability count . . . Young gets the job. Many manufacturers in the Diesel industry look to Young Creative Heat Transfer Specialists for the product-answers to cooling problems. High and low pressure intercoolers by Young are used on stationary engines, marine engines, locomotives, oil pumping stations and natural gas compressors throughout the world. Young quality starts at the design of the intercooler cores themselves — laboratory tested and scientifically designed to furnish the maximum heat transfer with a minimum restriction of air flow.

Intercoolers are only one of the many Heat Transfer products produced by Young. Why not put Young engineering to work for you — and solve your heat transfer problems now.

Write Dept. 409-D for Catalog 1652

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RACINE, WISCONSIN

Creative HEAT TRANSFER ENGINEERS

Executive Office: Racine, Wisconsin, Plants at Racine, Wisconsin, Matteon, Illinois

220 HP Diesel Tractors Join Be-Mac Fleet

To handle increased business that has been developed within its 1,200 route miles, Be-Mac Transport Co., Inc., has expanded its over-the-road fleet with the addition of 20 International model DCOT-405 diesel-powered tractors. According to President George R. Goode and Executive Vice President P. W. Goode, Be-Mac is enjoying the greatest volume of business of any year since the company was founded in 1932. The heavy-duty International diesel tractors were selected to provide greater equipmentutilization and faster service. With them, Be-Mac is able to pull larger loads and cut running time with straight-through service on long-haul schedules. Use of the diesel-powered rigs has reduced running time from St. Louis to Tulsa from 12 hours to 10 hours by eliminating the need for split schedules. Be-Mac's 320-truck fleet last year travelled 8½ million miles over routes in Missouri, Oklahoma, Illinois and Wisconsin. Gross revenue for 1958 will be over $5 million. The DCOT-405 International tractors are equipped with single-tire pusher axles, Page & Page suspension with ⅓–⅔ weight distribution, 50 in. cabs, Cummins NHB-600, 220 hp diesel engines and RoadRanger ten-speed transmissions.

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AP 929

Diesels Help Canada Grow

Our neighbors north of the border, in Canada, are growing in industry, population and strength. With this growth has come the need for better transportation—new roads, new bridges and new docks throughout the vast provinces of Canada. Diesels are playing an important part in this development. The J. P. Porter Co., Ltd., general contractors of Montreal, specialists in dredging, land reclamation, breakwater and wharf construction can boast of helping the country streamline and increase their transportation system through the use of a diesel-powered waterways plant.

One of the most recent accomplishments handled by the J. P. Porter Co. was the erection of the Burlington Beach Skyway. Burlington Beach, Ontario, has always been an important link in travel between Canada and the United States. For the past 60 years, Burlington Beach has been a popular summer playground for residents of Hamilton, Ontario and other nearby parts of southwestern Ontario and the Niagara Peninsula. Burlington Beach faces Lake Ontario on one side and Hamilton Bay on the other. A narrow channel connects the lake with the bay. In late 1958 the 8400 ft. long Burlington Beach Skyway was opened to traffic. Built under the supervision of the Ontario Highway Department and costing more than $17 million dollars, the bridge arch's almost the entire length of the neck of land closing off Hamilton Harbor from Lake Ontario. The spectacular structure serves a dual purpose; it breaks up the notorious Burlington Beach bottleneck of the Queen Elizabeth Way and provides better access to Hamilton Harbor for Great Lakes shipping traffic. It also acts as the completion of the final link of the Queen Elizabeth Way from Toronto to Niagara Falls and Ft. Erie on the Canadian side. The prac-

Aerial view shows the water diesel plant in action. Here can be seen the diesel dredge *Shuniah* pumping fill for the Burlington Beach Skyway project. The white stretch of beach along the shoreline is a section of already completed fill. Note pontoon line running from the stern of the dredge to the fill. Alongside the dredge is diesel tug *Brad* and in the right foreground can be seen work boat J.P.P. No. 3 with derrick scow J.P.P. No. 160. In the background can be seen Burlington Canal.

tical plan was to carry the skyway south of the roadway. To do this meant extending the beach on the bay side from 300 to 400 ft. in width the whole length of the skyway. This would be a costly operation were it necessary to haul the immense amount of fill needed for any distance. Fortunately, the fill was right at hand—hydraulic fill—and a saving between $500,000 and $600,000 was thereby effected.

The J. P. Porter Co., with its diesel water plant, placed a total of approximately 700,000 cu. yds. of granular material by hydraulic means in connection with the construction of the Burlington Beach Skyway. The work was carried out in three contracts. All three jobs were undertaken with the same plant. This included Porter's 20 in. diesel electric suction dredge *Shuniah;* derrick scow J.P.P. No. 160; diesel tug *Brad;* work boats J.P.P. No. 3 and J.P.P. No. 4 and varying lengths of floating and shore pipeline. Their 20 in. diesel electric suction dredge is powered by two Polar Atlas Model K-46-M 6 cylinder diesel engines, each of which develops 1100 hp at 300 rpm. These engines drive two English Electric 25 cycle 2200 volt

This view of the Burlington Beach Skyway, taken during construction, gives an indication of the size of the project.

generators. The generators drive a Canadian General Electric motor which is connected to the dredge's pump. The derrick scow, which services the dredge *Shuniah* is equipped with a Page model 4-11 crane and this crane is powered with a Page diesel engine. The Tug *Brad,* which is also part of this dredging unit, is powered by a Vivian 240 hp diesel engine.

Mr. H. Rindress, asst. chief engineer of the Porter company, related that, "All three of the contracts were carried out in more or less the same manner. Our hydraulic diesel powered dredge was set up on the specified borrow area and dredged a trench several hundred feet wide and 10 to 15 ft. deep parallel to Burlington Beach. The material was carried ashore through pipes supported on steel pontoons and was then carried progressively along the length of the contract through shore lines which generally discharged its material at the center-line of the required fill. There were cases, however, where the width of the fill was so great that it was necessary for us to run our shore pipe along two parallel courses so as to achieve the proper distribution of the pumped material." The material which the diesel dredge *Shuniah* pumped varied very considerably from contract to contract and in fact from station to station. This material ranged from extremely coarse gravel to a very fine sand and the deposit slopes varied from approximately six to one to upwards of twenty to one.

New General Managers Named at Eaton

Two Michigan divisions of Eaton Manufacturing Co. have new general managers succeeding veteran officials who retired Jan. 1 under the company's retirement program. Mr. F. I. Goodrich, vice president-administrative in charge of Eaton's seven Michigan divisions, announced that Howard R. Johnson, formerly assistant general manager of the Valve Division in Battle Creek, and Melvin L. Zuehlke, formerly assistant general manager of the Saginaw Division in Saginaw, have been promoted to general managers of their respective divisions. Mr. Harold I. Dyer, who has been general manager of the Valve Division since 1929, has retired. He continues in an advisory capacity on

H. R. Johnson

M. L. Zuehlke

matters pertaining to Eaton's new Brazilian subsidiary, Eaton S. A. Mr. H. F. Russell who for 45 years has been associated with Eaton and the former Wilcox-Rich Corp. which was acquired by Eaton, also retired as general manager of the Saginaw Division.

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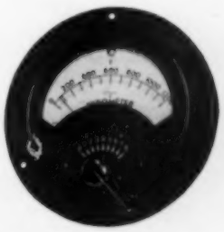

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It's a simple fact: your power investment will pay more dividends when protected by an Alnor pyrometer system! At a fraction of the cost of your present maintenance bills, a rugged Alnor system gives you an accurate check of exhaust temperatures—warning in advance of cylinder overload...preignition...scaled jackets...clogged ports...detonation...faulty injection.

Alnor accuracy and dependability set the standard in the industry. More diesel and gas engines are delivered equipped with Alnor Pyrometers, because manufacturers as well as users know that Alnor protection means assurance of minimum fuel consumption per horsepower and elimination of most common-cause breakdowns.

There's an Alnor Pyrometer and thermocouple assembly for every installation. Send for Bulletin 4361. Illinois Testing Laboratories, Inc., Room 508, 420 N. LaSalle St., Chicago 10, Ill.

Alnor **PRECISION INSTRUMENTS FOR EVERY INDUSTRY**

GM Bulletin Available On 110 Diesels for Logging

An illustrated brochure describing its heavy-duty series 110 diesel for logging trucks has just been released by the Detroit Diesel Engine Division of General Motors. The booklet lists features of GM Diesel two-cycle design contributing to efficient, profitable hauling operations and relates briefly the results of a 6-110 logging truck engine on rugged hauling operations recently in mountain regions of California. Power curves and engine specifications are included. Copies of the brochure may be obtained from GM Diesel distributors and dealers or by writing Detroit Diesel Engine Division, General Motors Corp., Detroit 28, Mich.

ITS NEW

NUGENT SIGHT FLOW INDICATORS
serve New Luxury Liners

Nugent Fig. 1001F Sight Flow Indicators are used aboard Moore-McCormack Lines' new *S. S. Brasil* and *S. S. Argentina* to indicate the flow of liquid through pipe lines.

Two new sea-going resorts, the luxury liners, *S. S. Brasil*, and sister ship, *S. S. Argentina*, have recently joined the Moore-McCormack Lines' fleet serving South America.

Built by Ingalls Shipbuilding Corporation at Pascagoula, Mississippi, both the *S. S. Brasil* and *S. S. Argentina* make extensive use of Nugent Sight Flow Indicators. They are installed in the various lines of piping aboard to indicate the flow of liquids through these lines.

Nugent Sight Flow Indicators have large, double windows to aid visibility. Standard windows are heavy plate glass for ambient temperatures, however Pyrex or Lucite windows are available. A spring-compensated indicator gate swings close to the inside surface of the window, moving in proportion to the flow, and is visible even when the liquid is dark or discolored.

Nugent Sight Flow Indicators may be equipped with electrical contacts to operate a warning bell or light, should liquid flow cease at any time.

If you have piping, through which the constant flow of liquid is essential, Nugent Sight Flow Indicators can be a most economical investment. It will pay you to write for complete details, today.

ESTABLISHED 1897

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OILING AND FILTERING SYSTEMS • OILING DEVICES
SIGHT FEED VALVES • FLOW INDICATORS

Gillett & Eaton Elect Cheney

Mr. Wendell C. Cheney was elected president of Gillett & Eaton, Inc., Lake City, Minn. and its subsidiaries at a recent meeting of the board of directors, when financial details of the sale of the company to Gould-National Batteries, Inc. were completed. Mr. Cheney was also elected to the board of directors of Gould-National Batteries, Inc., St. Paul and to the board of White Machine Works, Eau Claire, Wis. At the same time officers of Gould-National Batteries, Inc. were elected to the board of directors of Gillett & Eaton, Inc., Alfred H. Daggett was elected chairman of the board. Mr. Daggett, president of Gould-National Batteries, Inc., stated these elections implement their policy of maintaining present management in their newly-acquired companies. Mr. Cheney has been vice president and treasurer of Gillett & Eaton, Inc. and has nearly 35 years' experience in the piston business. From 1924 to 1939 he was associated with the Arrow Head Steel Products Company of Minneapolis, advancing from billing clerk to assistant general manager. In 1939 he came to Gillett & Eaton, Inc., his first assignment being to establish the manufacturing division for finishing pistons. Prior to this time the company produced castings only.

Nugent Appointments

Wm. W. Nugent & Co. Inc., manufacturers of oil filtering and lubricating equipment, announce the appointment of Carlson-Rutledge Co. as their representative for the Cleveland area. Carlson-Rutledge is located at 4500 Euclid Ave., Cleveland 3, Ohio. Sales Engineers, Eugene S. Carlson and David W. Rutledge, have very extensive backgrounds in the application of Nugent products to lubricating and filtering problems. Earlier, Nugent announced the appointment of Robert L. Wilkinson, Milton F. Brunner and William C. Stata to the position of factory representatives at their Skokie, Ill. main office. All these men have engineering backgrounds. Their duties will include contacting and aiding Nugent customers throughout the Continental United States, Mexico and Canada.

Time and Cost Record Books Available

To assist owners in determining the cost of owning and operating equipment, Caterpillar Tractor Co. has prepared a special 24-page Monthly Time and Cost Record Book. Twelve sets of pages are included on which to record, day by day, each month's individual machine expenses for an entire year. At the end of the record section is an annual summary sheet where the totals for each month can be entered to obtain annual cost figures. At the end of each month the columns may be totaled to determine expenses for that particular month. To help compute owning and operating costs, a section at the back of the book explains simple methods of calculation. In order to record expenses as they occur in the field, a pocket size Daily Time And Cost Record booklet is also available. This booklet can be used for recording time and expenses as they occur. Periodically, these figures may be transferred from the daily to the monthly cost record book. Copies of the "Monthly Time And Cost Record Book", Form 33215, and "Daily Time And Cost Record Booklet", Form 32818-G, can be obtained at no cost from Caterpillar Dealers or by writing to the Advertising Division of Caterpillar Tractor Co., Peoria, Ill. Requests for both publications should indicate title and form number.

ITS NEW

Area Sales Managers Named By Koppers

Mr. T. F. Naylor, sales manager of the Metal Products Division, Koppers Co., Inc., has announced the appointment of John W. Freund as manager of the Division's Central District with headquarters at Pittsburgh, Pa. At the same time Naylor also announced that Sidney H. Fedan, former assistant manager, Sound Control Department, will succeed Freund as manager of the Western District and will make his headquarters at Los Angeles, Calif. Both changes are effective immediately. Mr. Freund attended Johns Hopkins University in Baltimore where he majored in mechanical and industrial engineering. He joined the engineering department of Koppers in 1948 and was named an industrial engineer in the piston ring department in 1951. In 1953 Freund was appointed a sales engineer in the Metal Products Division's district office at Detroit, Mich., and was made manager of the Division's Western District in 1957. Mr. Fedan, a native of Buffalo, N. Y., graduated from New York University in 1935 with a degree in aeronautical engineering. He served in various capacities with Spartan Aircraft Co., Vega Aircraft Co., and Everel Propeller Corp. prior to joining Koppers in 1941. During World War II, Fedan was an executive engineer with Koppers Metal Products Division in Baltimore when the Division was producing war material for the various services. He was named manager of the aircraft propeller and industrial fan department in 1945 and was appointed assistant manager, Sound Control Department in 1956. In his new position, Fedan will supervise sales of the Division's products in 11 western states.

West Coast News

By James Joseph

ALHAMBRA, Calif.'s Vinnell Corp., world-wide constructors, have purchased three Murphy diesel electric sets, rated 100 kw, with ME-66 Murphy diesels (150 hp at 1200 rpm) driving Palmer generators . . . for project in Mexico.

TO Los Angeles' Transicold Corp., the first of 200 Four-99 Perkins diesels (33 hp @ 3000 rpm) to power truck-trailer refrigeration systems.

TREND: containerization for inter-line freight handling between trucks and ships for overseas shipments. Matson Navigation Co., for one, is trial-running the sea vans which will carry their own refrigeration and get power from small, lightweight diesel sets.

INSTALLED at Southern California and Southern Counties Gas Companies' Needles compressor station, two more 2000 hp Clark compressors, with 17-inch bore, 19-inch stroke, upping to six total Clarks now operative.

TO Safeway Stores, Portland, Ore., five Cummins NH-220 diesel engines for repowering Peterbilt rigs.

LEE H. Woods & Sons, Monrovia, Calif. contractor, has taken delivery of a Northwest 80-D shovel-dragline powered by a model 21 Murphy diesel, rated 161 hp at 1200 rpm.

TO California Salt Co., a #95 Northwest dragline powered by a model 21 Murphy diesel, for operations at Saltus, Calif. Sale by Los Angeles' Industrial Engine Service.

DELIVERED to George McGilvra, Portland, Ore., a Cummins 175 hp, JT-6-B for powering a White 3000 TD truck.

PURCHASED by Imported Auto Transport Co., Long Beach, Calif., a Volvo D-47 for a 540-series GMC truck, the engine rated 90 hp at 2800 rpm.

TO Blue Diamond Corp., Los Angeles, a model #6 Northwest clamshell (1½ yd. capacity), powered by a model 20 Murphy diesel, rated 144 hp at 1200 rpm.

TO Howard Taber, Missoula, Mont., a Cummins NTO-6-B to repower a Freightliner rig, sale by Cummins Diesels Sales, Inc., Spokane.

R. A. WATTSON Co., North Hollywood, has repowered a Buckeye #224 trencher with a model 6 Murphy diesel, 135 hp at 1200 rpm.

TO Hunter-Granger Sewage Treatment Plant, Salt Lake City, a Cummins H-6-IP for powering a 75 kw generator set. Sale by Cummins Intermountain Diesel Sales Co., Salt Lake.

TO Fentron Industries, Seattle, a Cummins NH-220 for repowering a Kenworth CC-521 truck.

THOUGH rated top secret, insiders say that the U.S.'s Russian-fronting net of super-sensitive radio receivers, monitoring Soviet transmissions, are diesel driven. Motorola Inc.'s Phoenix, Ariz. plant was among prime contractors.

IMPORTED Auto Transport Co., Long Beach, has also taken delivery of a 385 Volvo truck, with 5-speed Volvo transmission and a D-67 engine (115 hp at 2400 rpm).

New Assignments At Delco-Remy

A series of personnel shifts and advancements to important new posts at the Delco-Remy Division here were announced today by General Manager Don L. Boyes. The new assignments include: Perry W. House as manufacturing manager of Anderson plants reporting to H. G. Riggs, works manager; John D. Baker as assistant chief engineer succeeding House; Forrest A. Stinson as assistant general sales manager for original equipment succeeding Baker; R. C. Robertson as chief production engineer, a new post reporting also to the Works Manager. Also announced by General Sales Manager P. E. Bardsley is the appointment of John R. Mail as Detroit regional sales manager succeeding Stinson. In announcing the changes, Boyes pointed out that, in part at least, the new assignments are being made to give key personnel of the division a broader base of experience in all phases of Delco-Remy's business. "All of the men involved are veteran employes of the division, and for all it will mean increased as well as new responsibilities," he said.

New Florida Distribution

Announcement of new distributorship facilities for the entire state of Florida has been made by Cummins Diesel Sales Corp. Main offices will be located at Tampa with E. E. (Ed) Sandtner, a veteran of 20 years in the diesel industry, serving as general manager. Distributorship facilities will be at Miami and representatives will be located at Jacksonville and Tampa. Working with Sandtner in providing sales and service to power users throughout the state will be: W. C. Eberhardt, manager—Tampa. Mr. Eberhardt served as manager—field testing for Cummins at the parent plant prior to his new appointment; F. L. Bros, manager—Jacksonville. Mr. Bros was a fleet sales representative for Cummins at Atlanta, Ga. before receiving his new assignment; K. L. Sharp, manager—Miami. Mr. Sharp was manager of the Cummins operation at Kingsport, Tenn. prior to this appointment; M. T. Fellows, service manager—Tampa. Mr. Fellows was regional service representative in Chicago before receiving this new appointment. Mr. Sandtner said that immediate plans call for the establishment of waterfront sales and service points for users of Cummins Marine Diesels. Further plans call for the opening of a large new parts warehouse and rebuild shop in Tampa, and for the announcement of new dealers throughout the state.

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Wherever there's a heat transfer problem — whether with diesel engines or hydraulic equipment — there's a Yates-American exchanger to solve it.

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For 30 years, Y-A heat transfer products have proved themselves in the toughest assignments. Whatever your requirements, from die-drawn brass tanks to fabricated steel, Y-A can help you.

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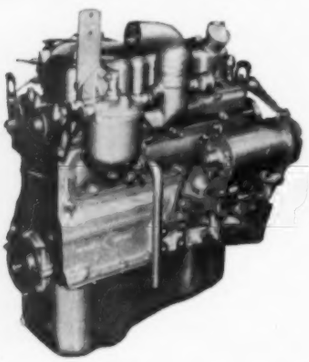
The "FOUR-99"
latest addition to the famous range of HIGH QUALITY PERKINS DIESELS



- All the speed and flexibility of a gasoline engine—plus diesel economy and rugged diesel power.
- Incorporates important advances in bearing design and a distributor type fuel pump permitting maximum speeds up to 4000 rpm.
- New patented combustion system ensures high combustion efficiency throughout the wide speed range.
- Basic weight only 320 lbs.
- Available in four types:
  - industrial —34.8 bhp at 3000 rpm continuous
    42.3 bhp at 3600 rpm intermittent
  - light truck —42.3 bhp at 3600 rpm
  - automobile—43 bhp at 4000 rpm
  - marine —31 shp at 2850 rpm
- Industrial model makes available a small four cylinder water-cooled diesel and opens up a new field in small industrial equipment.
- Automobile and light truck power units have been extensively tested in many different models of cars and trucks. On one test, after 20,000 miles, bore wear was only one thousandth of an inch. Write to us for further details.

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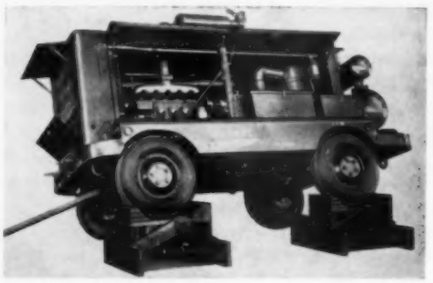
Rigid Tests Quality Rotary Compressor

A model "600" rotary compressor manufactured by the Jaeger Machine Co. of Columbus, Ohio, recently underwent one of the most gruelling series of tests ever devised for qualifying such equipment for government use. The tests, set up to demonstrate the unit's ability to meet the most exacting conditions, under which it could be called upon to operate, included starting under extremely adverse weather conditions; continuous durability runs of up to 650 hrs.; and operating in various tilted positions that could be encountered in actual operations. The test unit, powered by a General Motors 6-71 diesel engine, met and in instances exceeded government requirements and an initial order for 50 units was placed by U.S. Engineers. In one of the tests the unit was mounted on a dynamometer, and operating at 1725 rpm the diesel maintained 153.52 hp with ample reserve. Using the low pressure nozzle method, the compressor produced 617 cu. ft. of free air delivery per minute at 100 psi working pressure while operating at an ambient temperature of 125, plus or minus five degrees. During the endurance test, the compressor and engine ran for 650 cont. hrs. at rated speed and capacity using military fuels. Hourly recordings of capacity, discharge pressure, operating speed, fuel consumption and temperature of the compressed air at the receiver discharge outlet were logged. Results either met or exceeded Government test specifications. On the cycling test, the machine ran for an additional 350 cont. hrs. at rated speeds and capacity. Each cycling period of unloading the compressor took five minutes. This was primarily a shakedown test to check the durability of the machine.



The 15° tilt test demonstrated that the diesel-driven Jaeger compressor could be started and operated in various positions that might be encountered in actual operation.

In other tests the machine stood for 8 hrs. in 15° tilted positions from horizontal to right, left, front and rear, and was started and operated while in such positions. After being exposed to 25° below zero ambient temperature for 24 hrs. the machine was started instantly without preheating and aided only by standard cold weather ether priming. The machine was "soaked" for a period of 72 hrs. at 80° below zero to determine whether it could be safely stored at low temperatures without damage to parts of the compressor or engine. Roadability tests involved towing the machine for 25 miles over rough quarry roads at 5 mph, and for 50 miles over secondary roads at 25 mph. The machine was also subjected to a "storm" simulating

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(Fig. 288)

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a 3 in. rainfall in a 5 mph wind, with "rain" falling at a 45° angle on all sides of the machine. Soaked for 30 minutes under these conditions, it was then started instantly and continued to run for an additional 30 minutes while the downpour of water continued to fall on the machine. It was pointed out that in addition to exceeding the specified Government requirements on all of these tests, no repairs, alterations or adjustments of any kind were required either on the compressor or the engine.

Two Sales Appointments

Mr. Richard C. Keane has been appointed manager-all product sales for American Bosch Division, American Bosch Arma Corp., and Robert M. Whelan has been appointed manager of aftermarket sales, according to an announcement by Bertram L. Cole, general sales manager of the Division. In his new capacity, Keane is responsible for sales activities on all products of a non-military

Robert M. Whelan

Richard C. Keane

nature, both for original equipment to manufacturers and for the after-market. He was previously manager of manufacturers sales and has been associated with American Bosch since 1950. Mr. Whelan was previously assistant manager of service sales. He joined American Bosch in 1950 and spent several years in the field as a service sales representative, before being transferred to headquarters at Springfield, Mass.

D. M. McDowell Appointed Director of Engineering

D. M. McDowell

Mr. R. R. Newquist, president of Roots-Connersville Blower Division of Dresser Industries, Inc., has announced the appointment of D. M. McDowell as director of engineering effective immediately. Mr. McDowell will have responsibility for direction and management of all phases of Roots-Connersville's engineering program. Mr. McDowell's 20 years experience in engineering and management include work in all major engineering department functions, with special emphasis on the research and development of new products. He has been responsible for the research, development and operation of both defense and industrial equipment including aircraft engines, missiles, missile boosters, stationary and portable air compressors, and industrial and truck engines. Mr. McDowell resigned from the Le Roi Division, Westinghouse Air Brake Co., to assume his new assignment. A mechanical engineering graduate of Iowa State College, he is a Registered Professional Engineer, State of Indiana and a member of the Society of Automotive Engineers.

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The AMOT SAFETY CONTROL SWITCH, Model 2340, illustrated above, is of such high quality and priced so low, that it is suitable for the protection of all Diesels, from the low priced high production models to the largest and most expensive custom built engines. It protects engines against high jacket water temperature and low oil pressure. Model 2340 A, without reset button, is priced at only $30.00. Model 2340 B, illustrated, is $33.50. Nowhere else can you get such positive protection for so long a time at such a low price. Write for Amot Bulletin No. 387.

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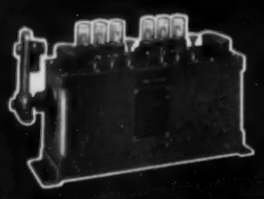

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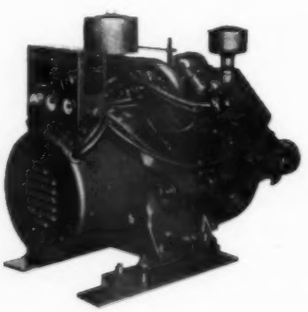

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4. ACCESSORY EQUIPMENT—Recent developments in fuel injection systems, governors, and other key accessory units are detailed and illustrated fully in this section.
5. MARKET PLACE—A convenient, time-saving listing of sources from which you can obtain the multitude of items and services needed by the fast growing Diesel Industry.
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Fifty Diesels In A Logging Fleet

Logging roads and 50 ton loads aren't something to shrug off. Moving massive loads of freshly cut green logs over rough-and-ready roads bulldozed out of the sides of mountains adds up to a tough trucking job. It's one that Stokes Trucking Co. tackles day in and day out—with conspicuous success. The Sweet Home, Ore. operator is one of the

most substantiai log haulers in the state. Stokes have more than 50 Diamond T diesels in their fleet. The trucks keep on the go from cutting sites far back in the hills, shuttling to and from sawmills owned by two major lumber producers. Average payload of Douglas fir, hemlock and cedar logs cuts out to more than 12,000 bd. ft. of lumber —sufficient to build a five room house, a separate garage and a picket fence around a suburban lot. Operating conditions are crude enough to curl the hair of the average over-the-highway trucker, for grades frequently are as steep as 25 per cent, deep ruts and mud are common and loads are always outsize. It takes a lot of skill on the part of the drivers to negotiate the winding, twisting routes, and it takes a lot of truck to stand up under the abuse of this severe service.

Shown is one of Stokes' newest Diamond T diesels, a model 950-SFD4600-OH, one of four recently put to work on this rugged operation. The trucks were custom-built for Stokes' service. Diamond T's 950 series, when built as off-highway models, are widely used for extremely heavy jobs, such as logging, oil field hauling and as dump trucks in construction work when payloads range upwards from 30 tons. Included in the specifications of Stokes' Diamond T 950-SFD4600-OH's are the following heavy-duty components: Cummins NH-220 diesel engine; Timken FG901 front axle and tandem rear axle; Fuller 5A1120 main transmission; Spicer 8031G auxiliary transmission; Spicer 14 in. 2-plate clutch and Kysor automatic radiator shutters. Wheelbase of the Diamond T diesels is 224 in.; tire size 12:00 x 24.

New Cat Twin Arc-Welder

A new, portable Twin Arc-Welder has been announced by engine division, Caterpillar Tractor Co. The welder, equipped with either skid base or running gear, uses the Cat D311 (series H) diesel engine and two Lincoln Electric welding generators. The generators each have a rating (NEMA) of 300 amps at 40 volts for simultaneous operation of two arcs. For parallel operation the Twin Arc-Welder is rated at 600 amps, 40 volts. The current range of each generator is 60 to 375 amperes. Two sets of generator controls allow welding at different voltages, amperages and polarity at the same time to permit precision adjustment for any type or size arc throughout the current range. A 3 kw capacity exciter provides a constant source of magnetic flux to the generators and 1.5 kw or more of power to two 115 volt dc auxiliary equipment outlets. Adequate engine reserve capacity assures a constant arc without fluctuation due to normal load variations. The engine is a Cat D311 four-cycle, four cylinder, valve-in-head precombustion chamber diesel. The standard Twin Arc-Welder includes 24 volt electric starting complete with charging generator and batteries, instrument panel and base-type fuel tank. Other than the cables, fuel and water, the welder is ready to start working upon delivery. Heavy-duty, four-wheeled running gear with springs and mechanical parking brake is available. This unit is 66.1 in. high with a 90.8 in. wheel base and a 60 in. gage. The standard unit with skid base is 116 in. long, 31.2 in. wide and 51 in. high. Two units (power for four welders) are easily mounted on one truck. Approximate weight of the standard machine is 4,035 lbs. For additional information and specifications contact Engine Division, Caterpillar Tractor Co., Peoria, Ill. (ITS NEW)

Powered by the Cat D311 (Series H) Diesel Engine, the new skid base Cat Twin Arc-Welder features two sets of generator controls, allowing welding at different voltages, amperages and polarity at the same time.

Fairbanks-Morse 180 hp at 257 rpm, Serial 647398, Style YA, 3 cylinders, Type 32E, 14 x 17 Diesel Engine.

Fairbanks-Morse 120 hp at 257 rpm, Serial 662500, Style FBM-Y, 2 cylinders, Type 32E, 14 x 17 Diesel Engine, Direct connected to Fairbanks-Morse, 72 kw, 3 phase, 60 cycle Generator 480 volts.

Fairbanks-Morse 25 hp at 325 rpm, Style HB Diesel Engine.

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Appoint Gerald District Manager

Sealed Power Corp. announces the appointment of H. L. (Bert) Gerald to the position of district manager of the Kansas City territory, succeeding the late Everette J. Ingersoll. Mr. Gerald brings to his new position a wealth of experience in the automotive after market. Although comparatively young, he is a veteran of 20 years in the piston ring and parts industry—all in field sales work. Since 1952 he has been in charge of sales for Sealed Power in West Texas, the panhandle area and New Mexico. In this capacity, he has established an excellent record and is especially well qualified to assume his new responsibility.

Hedding Named To Delco-Remy Post

Vice Admiral Truman J. Hedding, U.S. Navy retired, has been named technical assistant to General Manager Donald L. Boyes of General Motors' Delco-Remy Division where he will serve as executive representative for the division on defense programs. In naming Admiral Hedding to the key Delco-Remy assignment, Boyes revealed that the division is now broadening its own development program in the defense area. "While Delco-Remy at this point holds no contracts or sub-contracts in the aeronautical or missile fields, we are devoting considerable of our own resources to programs of interest to the Defense Department," Boyes said.

New Tennessee Distributor

Hercules Motors Corp. has appointed J. B. Cook Auto Machine Co. of Nashville as distributor in Tennessee. The Nashville company—one of the nation's largest independently owned automotive parts distributors—operates three main stores in Nashville, Memphis and Little Rock, Ark., and a total of 15 branch stores in Tennessee, Kentucky, Arkansas and Mississippi. The new distributor will handle Hercules' entire line of air-cooled and liquid-cooled gasoline, diesel and LPG (liquefied petroleum gas) industrial and automotive engines—ranging in capacity from 1 to 600 hp. J. B. Cook makes its headquarters at 1503 McGavock Street, Nashville. Founded in 1914, it has been in business at its present location for the past 25 years. Principle officials in the Nashville main store, include: J. D. Caruthers, manager; G. B. Gailey, purchasing agent, and P. Neal, credit manager. The company's Tennessee branches are located in Columbia, Clarksville, Dyersburg, Murfreesboro, East Nashville, McMinnville, Tullahoma, Shelbyville and Franklin. In Kentucky, its branch is located in Hopkinsville. The company has enjoyed a steady growth throughout the years, and has expanded its facilities to include modern, up-to-date machine shops, serving all users of internal combustion engines—plus a large inventory of replacement parts for automotive vehicles.

Two New Regional Managers

Two new regional managers have been appointed by American Air Filter Co., Inc. Mr. John J. Willis has been named to the newly-created post of midwest regional manager and A. B. 'Tony' Ullrich, Jr., has been selected southern regional manager, succeeding Morris G. Munson, who will retire at the end of this year. Mr. Willis will assume his new duties in addition to that of manager of Illinois Engineering Co., a manufacturing division of AAF. He will be headquartered at 2035 South Racine Ave., Chicago. Mr. Ullrich will be located at 7810 Braeburn Valley Drive, Houston, Tex. and Munson will assist Ullrich for the remainder of the year until his formal retirement.

New Couplings Catalog

An illustrated 20 page catalog, in color, describing the extensive line of Quick-Seal couplings for hydraulic and pneumatic applications has been issued by Titeflex, Inc. The new bulletin, No. Q.S.R. 58, discusses all three types of Titeflex Quick-Seal couplings—straight-through, single check-valve, and double check-valve, which are available in a variety of sizes and alloys to meet operating requirements. These couplings are designed to handle chemicals, oils, greases, gases, liquids or any material that will flow through a line. Cross-section drawings of the Titeflex Quick-Seal coupling point out major features of the component, which is leak-proof at all operating pressures; may be coupled or uncoupled quickly without special tools; and all couplings are interchangeable in the same sizes. Complete details and cross-section drawings of the couplings are given for each basic type. An extensive chart giving information for the selection of seals for couplings in various temperature ranges is provided, along with flow data, pressure data, and complete information on caps and plugs for Titeflex couplings. For a copy of the new Catalog, write: Sales Promotion Dept., Titeflex, Inc., Hendee St., Springfield 4, Mass.

ITS NEW

GM Bulletin on Marine Power

GM Diesel's new all-purpose power line for boats and the extent to which it covers the power boat market in the 20 to 1650 hp class in only three cylinder sizes is revealed in a new marine folder just released. Entitled "Marine Engines for Pleasure and Profit", the folder gives power ratings and weights of single and multiple diesels adaptable for installation in pleasure and work boats 23 feet and up. The folder covers the eight new "V" and in-line engines added to GM Diesel's line in January which more than doubled the number of basic engines offered by the Division. Described and illustrated is the entirely new series 53 line—covering the 20 to 195 hp range—which hurdles the barriers of size and weight formerly limiting the use of diesels in smaller boats. Four new V-71 engines widen the power range of the in-line series 71 for boats. Copies of the brochure may be obtained by contacting GM Diesel distributors and dealers or by writing Detroit Diesel Engine Division, General Motors Corp., Detroit 28, Mich.

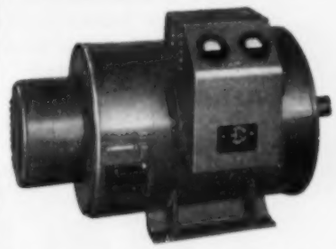
ITS NEW

HERE IS IMPORTANT INFORMATION! The completely new 1958 edition of the **DIESEL ENGINE CATALOG**, Volume 23, is now available. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company orders to **DIESEL ENGINE CATALOG**, 816 N. La Cienega Blvd., Los Angeles 46, Calif.

Power on tap!

A NEW 5 TO 50 KW "PACKAGED" GENERATOR

REG-AMP



REG-AMPS are available for 1800 and 1200 rpm operation, single- or 3-phase power, at all standard low voltages. REG-AMP shown has single bearing. Two bearing units are also offered.

It's a complete source of a-c electric power and the perfect mate for your engine

REG-AMP is a revolving field a-c generator with direct-connected exciter, built-in automatic voltage regulator, and a-c ammeter and voltmeter. It's factory assembled, internally connected, and tested.

Regulates voltage automatically. Simple relay constantly senses output voltage and keeps it right for best operation of your motors, lights, and electronic equipment.

Positive voltage control. Voltage can be adjusted to compensate for line voltage drop or normal engine speed droop under heavy load.

Starts big motors fast! Coordinated regulator design gives quick response.

Easy to install, simple to operate. Fully self-contained. Requires no switchboard. Merely couple to engine and connect to load thru suitable switch.

Needs little maintenance. Only an occasional check for cleanliness and brush wear.

Fabricated steel frame. Rigid, dripproof frame keeps REG-AMP safe, clean, and dry.

Performs smoothly. Every design is painstakingly engineered. REG-AMP is a product of 50 years of E-M Generator experience.

Get more information from your nearby E-M Sales Engineer. Also, write E-M for publication PRD-246 . . . it gives complete REG-AMP ratings.

E-M

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Minneapolis 13, Minnesota

Largest manufacturer of "Packaged" Generators

KEEP YOUR ENGINES RUNNING CLEAN AND LONGER

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WITH FULL FLOW AND BY-PASS FILTERS FOR ENGINE LUBE AND FUEL OIL

Clean Oil – Clean Engines

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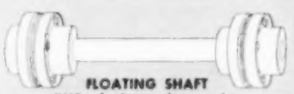
FOR MAINTENANCE FREE POWER TRANSMISSION on PUMP, COMPRESSOR, MARINE and OTHER DRIVES

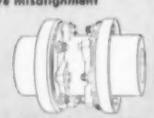
DBZ — for high speed, heavy duty drives

Thomas' 40 years of flexible coupling experience is at your disposal to help you meet ordinary applications or special variations for unusual cases.



FLOATING SHAFT
BMR — for heavy duty service with excessive misalignment

SINGLE FLEXING
SS — for engine-driven generator sets with out-board bearings



DOUBLE FLEXING
AMR — for engine and medium speed drives

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES.

1 Freedom from Backlash Torsional Rigidity
2 Free End Float
3 Smooth Continuous Drive with Constant Rotational Velocity
4 Visual Inspection While in Operation
5 Original Balance for Life
6 No Lubrication
7 No Wearing Parts
8 No Maintenance

Write for Engineering Catalog

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U. S. A.

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SLUDGE *situation gets a clean-up*

STANODIESEL Oil M helps keep diesels clean and running smoothly at Princeton, Missouri

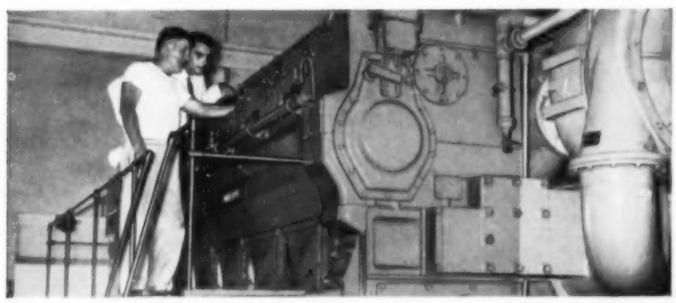
The situation: Consumer Public Service Company, Princeton, Missouri, has three diesels in service—a 225 hp unit installed in 1951, a 1,083 hp unit installed in 1954 and a 1,440 hp unit installed in 1956. In previous equipment, sludging had been a problem, so when these units went into service, a heavy duty oil was recommended—STANODIESEL Oil M.

What has happened: The oil has been inspected regularly by a Standard Oil lubrication specialist. Samples are periodically removed for analysis at Standard's Whiting Indiana research laboratory. Analysis shows the oil to be in excellent condition. Since the 1,440 hp unit was started up in 1956, it has generated 1,672,200 kw hours of electricity.

What you can do: Find out more about how STANODIESEL Oil M can deliver service in your plant. Ask for more information from the Standard Oil lubrication specialist near you in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Quick facts about
STANODIESEL Oil M

- Keeps crankcase, pistons, cylinder walls clean.
- Combats deposit and wear problems imposed by use of economy fuels.
- Maintains film on difficult-to-lubricate parts.
- Eliminates fuel injector and pump sticking caused by deposits on injector barrel and plunger where fuel and lube oil mix.



Darrel McCormick, Standard Oil lubrication specialist and William Rutledge, plant superintendent, inspect 1,440 hp diesel in Princeton, Missouri plant. Darrel is an experienced hand at this work. He has an engineering degree from Vanderbilt University plus four years' experience in industrial lubrication work at Standard Oil. He has also completed the Standard Oil Sales Engineering School.

You expect more from STANDARD *and you get it!*

Don Decker, *Superintendent of Caro Plant (left), and Orville Hurford, Manager of Thumb Electric Cooperative, Ubly, Michigan, display 1956 plaque. And now...*

Caro repeats for top efficiency honors

...Cooper-Bessemer power wins 8th award in 8 years!

For the most efficiently operated REA internal combustion plant in Division A (under 5000 kw), the 1958 Diesel Progress plaque goes to Thumb Electric's Caro plant. Its economy record was 6.66 mills net kwh. Caro also won in 1956.

This marks the 8th time since 1951 that a Cooper-Bessemer powered plant has won these efficiency honors.

Caro's consistently excellent performance is attained with three 8-cylinder Cooper-Bessemer turbocharged gas-diesels rated 1850 hp at 327 rpm.

We will gladly help you apply this kind of economy to *your* operations. Call our nearest office.

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